The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Textile Chemistry

TEXTILE chemistry is an intricate subject hedged about with a good deal of secrecy. The problem of improving textile materials in their colour, qualities or wearing properties is one of considerable complexity and importance, and even within the lifetime of the youngest practising chemist there have been striking developments. Dr. C. J. T. Cronshaw gave to the Royal Society of Arts an exceedingly simple account of these developments and of their chemistry, but one may be pardoned for suspecting that in giving a more technical account he would have been handicapped by the secrecy that surrounds the chemical constitution of many of the substances used. Textile manufacture may perhaps be properly considered as an art rather than a science; it is an art to which science is applied and is being applied with ever-increasing pressure. As befits an art, many of the developments come from without and not all are the product of conscious chemical research. That is not to say that there is not an enormous amount of research involved between the consciousness of the need for a given agent or process and its development on the manufacturing scale.

This point has been explained by Mr. D. Carter who, having pointed out that a new development may come from within or from without the chemical industry, indicates that the procedure followed is to hand the invention over to a Service Section, which forms the link between the research worker and the textile industry proper. It may well be suggested that a scientific liaison department of this character would have a wider application in other branches of industry. Too often there is divorce, or at the best a cat-and-dog marriage, between the laboratory and the works. In some industries it is a difficult problem of organisation to secure a scientific backbone running through a whole concern from raw materials to consumer. The textile industry appears to have found a solution in a special Service Department which must obviously be staffed with unusual chemists having scientific, technological and marketing knowledge.

Dr. Cronshaw recounted how the explanation of the action of wetting agents and emulsifying agents depended upon the academic researches of Langmuir. A paraffinic polar chain molecule of moderate length (generally less than 12 carbon atoms in length) can form a monomolecular film on liquids and act as an emulsifier; and a longer carbon chain compound having at one end a polar group (water soluble) and the other a paraffinic group (miscible with fats) can act both as an emulsifier and as a wetting agent, creating "a marriage between such mutually repulsive materials as water and fat." It would appear that wetting agents have chains from 12 to 16 carbon atoms in length. A new property is introduced when the chains, still retaining the polar group at one end, are from 16 to 20 carbon atoms in length; these compounds have remarkable detergent properties. They form no scum with hard waters and can be used as soaps even in sea water; they can be used in presence of acid and alkalis; they contain no free fats and are neutral in solution; they are used as washing agents for textiles, for wool-scouring, and, of course, for laundries and shampoo powders.

A special section was devoted by Dr. Cronshaw to quaternary ammonium compounds. These compounds are also of the straight-chain type with a water-soluble end, but in this instance the water-soluble end has a nitrogen atom in which four of its five valencies are satisfied by hydrocarbon groups. Fixanol (cetyl pyridinium bromide) is an example of this type of compound; it is soluble in water and renders direct dyeings on cotton fast to treatment by water and acids and to perspiration. On the other hand, a compound of the same group, known to the trade as "Lissolamine," which contains a cetyl quaternary ammonium salt, when used in alkaline solution with hydrosulphite, will remove the colour of even material dyed with Turkey Red, leaving only white calico. A new and remarkable material, also of this group, is "Velan," a pyridine compound, which renders cotton, wool, silk rayon and linen water-proof. "Velan" is soluble in water, and is used by treating the materials with Velan solution, followed by subsequent heating to 150 deg. C. to complete the reaction. Dr. Cronshaw stated that the water-proofing is not removed by treatment at the laundry 90 times, nor by normal dry-cleaning processes. It will not withstand fats, so that although a cloth is not stained by tea, coffee or alcoholic drinks, nor marked by ink spilled on it, splashings of fat will penetrate it. Dr. Cronshaw gave a very full description of the process of "velanising" materials and one feels that much more will be heard of it. What a godsend to every clumsy male who has ever got into trouble for upsetting his tea on the nice clean cloth! Dr. Cronshaw is to be congratulated upon a highly successful review of a complex branch of the chemical industry.

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NOTES AND COMMENTS

New Research Station

BY the end of 1939 the new experimental station of the British Coal Utilisation Research Association at West Brompton, London, had begun to function. This development is another example of the progressive manner in which the Association has tackled research on behalf of the coal industry. The industry itself has displayed an enlightened regard for the value of research and in 1933 helped to finance the Combustion Appliance Makers' Association (Solid Fuel) which contained the seeds of a central research organisation. The C.A.M.A. established a research department, an experiment which proved eminently successful and led to the formation of the Coal Utilisation Research Association. It has been stated that it was clear from the outset that this Association could not attempt to finance research into " oil-from-coal " processes, most of which can be studied usefully only in full scale commercial plant involving capital expenditure altogether out of proportion to the resources of the Association. On the other hand, the use of coal as a fuel is clearly reaching the stage at which long-range research is required to bring about major advances and many aspects of such long-range research can be carried out at comparatively small cost. The Council of the Association decided, therefore, to concentrate attention upon solid fuel combustion and ancillary processes, and a programme of research was drawn up accordingly. The new experimental station has been equipped to enable that programme to be put into operation.

Export of Chemicals to Sweden

RECENT advices from Sweden indicate that the threatening attitude lately adopted by the Nazis towards the Scandinavian countries is far from having the intimidating effect aimed at. So far from inducing the Swedes to increase their orders for German products, this hectoring attitude is having an adverse psychological effect on the independent spirit of Swedish importers. Up to the present, for example, German chemical products have admittedly had the upper hand in the Swedish market; but now the demand in this market for chemical products of British origin is showing a steady increase. Judging by the number of very welcome inquiries that THE CHEMICAL AGE has received from Sweden, it is obvious that there is a large potential market there for British makers of chemical products; and there is every indication that the Swedish Government authority that regulates imports is very far from hostile towards increasing the volume of chemical trade between our country and theirs. As British export trade provides the additional credits that are vital to this country in its present campaign, traders who take advantage of this friendly tendency will be performing a patriotic act as well as improving their own commercial position.

Oxidation of CH_3OH with Vanadium Oxides

DATA which appear to necessitate a drastic revision of the generally accepted views on the role of vanadium oxides in methyl alcohol oxidation are published in a recent paper by Canneri and Cozzi (La Chimica e L'Industria, December, 1939, 653-5). These workers have demonstrated the formation during catalytic oxidation of methyl alcohol in the vapour phase of definite methyl esters of vanadium, in particular the methyl ester of orthovanadic acid. These methyl esters react further with water to form lower oxides of vanadium and a mixture of methyl alcohol and formaldehyde on the lines of the following equations:

$$6\,CH_3OH + V_2O_5 = 2\,(CH_3)_3VO_4 + 3\,H_2O$$
$$2(CH_3)_3VO_4 + 2\,H_2O = V_2O_4 + 5\,CH_3OH + CH_2O$$
$$2(CH_3)_3VO_4 + H_2O = V_2O_3 + 4\,CH_3OH + 2\,CH_2O$$

The lower oxides, which have been isolated from the reaction mixture in the form of a green powder dissolving with a greenish-blue colour in sulphuric acid, are regarded as the active constituents of the catalyst mass in the formation of formaldehyde. In the authors' opinion the new light now thrown upon the mechanism of methyl alcohol oxidation deprives the claims advanced in many patents dealing with the manufacture of specially active forms of vanadium oxides of all their value.

Swiss Chemical Industry

THE generally good situation of the Swiss chemical industry in the second half of 1938 was maintained in the first half of 1939. This period of steady development and the promise of new improvements was followed, in the two months preceding the war, by unusually heavy demands due to the aggravation of the political situation and the consequent desire to lay in large stocks. This attitude of buyers in the principal selling districts still continues, and that is why the export figures for aniline dyes and for chemicals show an increase, both in value and in weight sold. To this increase there is no corresponding increase in consumption. Export figures for 1939 are favourable, but it must not therefore be concluded that the Swiss chemical industry is on the threshold of a period of great prosperity. The great changes resulting from the war interrupted the normal evolution of the pre-war period; important markets have been lost in a day, and economic and financial difficulties put an end to business in other markets, and though increased orders have come from certain countries, it would be unwise to count on the continuation of this increased demand. For although the export figures available are to some extent favourably influenced by pre-war orders, import quotas, exchange control and other commercial obstacles have been aggravated by the war in almost all countries, and the negative effect of these factors on the export of chemicals has yet to become evident.

RECENT ADVANCES IN TEXTILE FINISHING AGENTS

Synthetic Resins and Cellulose Derivatives

By
L. LIGHT, Ph.D., A.I.C.

SYNTHETIC resins have continued to engage the close attention of the textile industry in the past few years in view of the many useful effects that are attainable with their aid. Originally adopted for their anticreasing properties, resins are now used in addition for fireproofing, dulling, stiffening and rendering fabrics water-repellent.

To dispense with the necessity for an acid catalyst on the fibre to promote resinification of the intermediate water-soluble urea-formaldehyde condensation product, the latter is blended with a starch prior to impregnation.[1] A permanent chintz finish is imparted to furnishing fabrics with the aid of a urea-formaldehyde impregnating solution containing albumen and a bodying agent such as methyl cellulose.[2] On passing the impregnated fabric through a hot calender, formation of the insoluble form of the resin and coagulation of the albumen occur simultaneously. Fabrics can be rendered permanently water-repellent by treatment with a copolymer of maleic anhydride and a long-chain aliphatic vinyl ester or ether, an example of which is vinyl octodecyl ester.[3] This effect can be enhanced by impregnating the fabric before or after this treatment with a urea resin intermediate (dimethylol urea and a trace of tartaric acid).[4] Other hydrophobic agents applied in conjunction with a urea-formaldehyde resin for the purpose of conferring both wash- and crease-resistance upon cellulose and animal fibres are the higher fatty methylolamides, e.g., the methylolamide of stearic acid.[5] The two components may be applied separately to the fabric, a typical solution containing stearic acid methylolamide emulsified with oxyethylated sperm oil alcohol, dimethylol urea and a trace of tartaric acid. Water-resistance and crease-resistance are also imparted to cotton and other fabrics by impregnation with quaternary pyridine compounds containing the urea grouping, e.g., stearylureidomethyl pyridinium chloride. These compounds are among the latest additions to the pyridine compounds used in the "velan" and "zelan" processes. Typical representatives of previously introduced agents are octadecyl oxymethyl pyridinium chloride and stearamidomethyl pyridinium chloride.

Alternative Agents

Several agents have been proposed as alternatives to urea-formaldehyde anticreasing resins, notably those obtained by condensing formaldehyde with other substances containing amino or amide groups. Materials of very great promise are the aminotriazine-formaldehyde resins, notably those derived from melamine, a triaminotriazine now produced economically from cyanamide or dicyandiamide.[6] Cyanamide- and dicyandiamide-formaldehyde resins also find application, the former for improving the dyeing properties of viscose,[7] the latter for the anticreasing of fabrics under neutral or alkaline conditions.[8] The discovery that the intermediate water-soluble condensation product from dicyandiamide and formaldehyde hardens under alkaline conditions has suggested the possibility of utilising as catalyst the alkali left in fabrics after mercerisation. Several patents on the treatment of fabrics with aminotriazine-formaldehyde resins point to their value for stiffening, anticreasing and waterproofing.[9] A rayon fabric-dulling preparation in the same class was introduced recently under the name of Uromat. Starch finishes resistant to boiling are obtained by impregnating fabrics with a mixture of starch and a water-soluble melamine-formaldehyde intermediate product and fixing by heat.[10] Like the urea resins the triazine-formaldehydes are notable for their glass-like clarity but possess the additional advantage of convertibility to the insoluble final form at a comparatively low temperature.

Anticreasing, dressing and matting agents have been prepared by condensing formaldehyde with an alkylene or arylene diurea or dithiourea, e.g., ethylene diurea and 1,5-naphthalene diurea.[11] Condensation products of dicyandiamide or guanidine with formaldehyde are recommended as fireproofing agents for brushing on to fabrics and do not impart a glossy surface.[12]

Ketone-Formaldehyde Resins

Ketone-formaldehyde resins present some features of interest in textile finishing. Shrink-resistance is said to be conferred upon fabrics by impregnation with a water-soluble acetone-formaldehyde compound which is afterwards resinified in an alkaline medium.[13] The process can apparently be conducted in the absence of external heat. Thus, a voile fabric is impregnated with a cooled solution prepared by adding 7 parts strong caustic soda to an ice-cooled mix of 5 parts acetone and 25 parts 40 per cent. formaldehyde. On exposure to the air for a short time at the ordinary temperature, resinification occurs with evolution of heat. The residual alkali is neutralised before finishing in the ordinary way. Another resin in this class, now available in a glass-clear form, is that derived from methyl ethyl ketone[14] which has been introduced to the plastics industry.

The treatment of textiles with vinyl resins is illustrated by several recent processes. Stiffened multi-ply fabrics which are stable to laundering are produced by coating or impregnating one layer of cotton or viscose with an aqueous emulsion of a vinyl compound and uniting with one or more layers of untreated fabric by application of heat and pressure.[15] An example of a treating medium is a benzene solution of polyvinyl isobutyl ether emulsified with an aqueous solution of sodium oleate. Ethylene imine, already known in the textile trade as an animalising agent for cellulose fibres,[16] is an example of a polymerisable alkylene imine which can be reacted with a vinyl polymer to form a water-proofing agent.[17] For example, 30 parts viscous polymerised ethylene imine are reacted with 500 parts of a 20 per cent. aqueous solution of the ammonium salt formed by saponification of the copolymer of maleic anhydride and vinyl acetate. Ethylene polyamines have also been reacted in the same way with vinyl compounds and a resin suitable for both water-proofing and anticreasing is derived from triethylene tetramine and methyl vinyl ketone. Acrylic resin emulsions have been offered to the textile trade for some years (e.g., the plextols) and a recent addition to this particular group of vinyl compounds is the copolymer of methyl methacrylate and 2-ethyl hexyl acrylate, likewise in emulsion form.[18] These resins are renowned for their chemical inertness, impermeability to water and flexibility. Emulsions thickened with sodium alginate or methyl cellulose are recommended for water-proofing, while dilute emulsions of the order of 1 per cent. are sufficient for dressing or improving the feel of fabrics.

Several attempts have been made in recent years to improve the crease-resistance of fabrics with the aid of inorganic salts. A metal compound forming a vitreous film, e.g., a zinc borosilicate prepared from zinc acetate, borax and sodium

silicate, has been used in solution in acetic acid and glycerine. After impregnation the fabric is dried at 100-150° C.[19] Cellulose fibres have been treated with borax solution in association with an emulsion of a vegetable oil in a soap or a fatty alcohol sulphonate.[20] The German proofing agents, Preska 320 and 331, are understood to be solutions of a water-soluble substance of pronounced crystallising tendency (borax, sugar, urea, etc.) in which a fat is dispersed. The latter promotes deposition of the water-soluble agent upon the fibre in an amorphous or microcrystalline form.[21] Improved crease-resistance is thus imparted to a staple fibre-wool mixture by running in a foulard through a solution containing 50 gm. borax and 10 gm. weakly alkaline coconut oil emulsion in a litre of water.

Delustring Pigments

Pigments such as barium sulphate and titanium dioxide are well established as rayon delustring agents but are liable to come away as dust in some cases. Permanent matt effects can now be obtained, however, by pretreating viscose fibre with the sulphate of an organic base with affinity for the fibre, rinsing and passing through a barium chloride solution.[22] Rayon may be delustred and acquire a soft and full handle by brief immersion at 40° C. in a bath of 5 gm. stearyl biguanide hydrochloride per litre, followed successively by passage through sodium sulphate and barium chloride solutions. The same effect can be achieved more conveniently by applying the matting pigment itself in suspension in a solution of a salt of an alkyl derivative of a diamine containing more than ten carbon atoms in the alkyl radical.[23] As in the previous process the pigment is attached to the fibre with sufficient firmness to be fast to rinsing. A typical bath contains one gram barium sulphate, 0.15 gm. dodecyl biguanide and 0.1 gm. stearyl sarcosine triethanolamide in a litre of water.

Wool can be rendered non-felting by treating with a very dilute solution or dispersion of a water-insoluble, low-molecular cellulose ester or ether.[24] Suitable esters are cellulose acetate and cellulose formate. Wool skeins are immersed for one minute in a 1 per cent. solution of cellulose acetate in acetone, wrung out, dried in the air and again subjected to the same treatment. After the second drying they are treated in a solution of 2.5 gm./litre of octodecyl alcohol sulphonate and 2.5 gm./litre of octodecyl alcohol. Methyl cellulose has become familiar to the textile industries both in the water-soluble and alkali-soluble forms. To the second category belong Tylose 4S (Kalle), which gives a cretonne effect on staple fibre, Tylose 4S 25, which produces a linen-like feel, and Tylose 4S 60, which is a highly viscous grade recently developed to cater for the demand for wash-resistant white goods loaded with china clay, titanium oxide or other pigments. Alkali-soluble methyl celluloses are also produced in England (Cellofas AF of I.C.I.), in America (Ceglin of the Sylvania Corporation) and in France (Rhodaprêt of Rhône-Poulenc).

Impregnation Treatment

Treatment consists generally in impregnating fabrics with a solution of the desired viscosity in 5-13 per cent. caustic soda and fixing the methyl cellulose on the fibre by passage through an acid bath. Water-soluble methyl cellulose finds application in ordinary sizing operations when they may be used in conjunction with starches and are notable for their ability to fix many times their weight of pigment. Typical commercial grades are Tylose TWA (Kalle), Cellofas WLD (I.C.I.), Palostan E and F (Kalle), Rhomelose O and S(Rhône-Poulenc), Colloresin DK(I.G.), Hortol A and S(Böhme Fettchem.Ges.). Regenerated cellulose has been used to secure permanently crisp, sheer effects on light-weight fabrics in the United States.[25] The fabric, light-weight lawn for example, is impregnated with viscose solution and mercerised under tension after regeneration of the cellulose. Ammoniacal copper hydroxide solution of cellulose has also been used in the United States for producing sheer, transparent and stiff effects on light-weight fabrics.[26] The fabric is passed through a bath containing ammoniacal copper sulphate in caustic soda, the excess liquid removed by nip rolls before passing through an acid bath and the cloth finally mercerised while wet.

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Ammonium Nitrate

Progress of Production in Italy

RECENT progress in the production of ammonium nitrate in Italy is described by Maveri (*Chimica e L'Industria*, 1939, *21*, 10, 572-577).

The improvements described are the work of Fauser, and are designed to render more efficient the utilisation of the heat developed in the reaction between ammonia and nitric acid, which amounts to 25.6 kilocals per mol of product, which works out at 321 kilocals per Kg. of ammonium nitrate produced as a 62.8 per cent. solution. This is an amount sufficient to evaporate nearly all the solvent water, but the ordinary forms of converter do not permit of its complete utilisation because of losses of nitrogen which would occur were this attempted.

Fauser preheats the aqueous nitric acid and ammonia in separate serpentines in the same bath heated by steam evaporated from the ammonium nitrate solution produced in the converter. The converter is a tall cylindrical vessel containing a coaxial cylinder inside it which constitutes the reaction space. The reactants are squirted upward into this space, the acid through a centrally located pipe, the ammonia through a circular multi-holed distributor. A helical stirrer extending to the bottom of the reaction space acts as a pump to maintain the circulation of fluid upward in the reaction space, and downward in the annular space surrounding the inner vessel. The heat developed in the reaction space heats the liquor flowing downwards in the annular space, and evaporates water from it, while, since the reaction takes place mainly at the bottom of the vessel, where the liquid is under the pressure of the atmosphere plus that of the superincumbent layer of liquid, no boiling, and therefore no loss of nitrogen in the form of free ammonia or acid, can take place from the reacting solution. Conditions can be adjusted so that the liquor, eventually overflowing through a pipe at the top of the converter, contains 90 per cent. of ammonium nitrate; this liquor is "crystallised" in two chambers in which the excess water is evaporated by a current of warm air, the heat evolved in the various allotropic transitions of the nitrate when cooling contributing its share towards heat economy. The starting materials for the process are 56.2 per cent. nitric acid and gaseous ammonia.

SOME TEXTILE DEVELOPMENTS OF 1939

Artificial Fibres and Bleaching Processes

By
G. S. RANSHAW

UP to last year it was impossible to apply the term "synthetic" with real justice to any commercial textile yarn, and the textile high-light of 1939 was undoubtedly the appearance of Du Pont's "Nylon" which is truly synthetic, is a commercial proposition backed by powerful interests here and in America, and is, moreover, a product possessing new and interesting properties.

As early as 1932 the writer drew attention in the technical Press to some remarkable work accomplished by W. H. Carothers and Julian W. Hill at the experimental station of Du Pont de Nemours in the United States, which undoubtedly laid the foundations for the recent triumph. These American chemists had been studying certain so-called polyesters, derived from dibasic acids of the series $HOOC(CH_2)_xCOOH$ and glycols of the series $HO(CH_2)_yOH$, and had succeeded in obtaining products whose molecular weights ranged from 800 to 5,000. These esters were microcrystalline solids dissolving readily in appropriate solvents. Their solutions were not highly viscous and they showed no sign of an inherently colloidal behaviour. They were, however, the starting point for the production of polyesters of the same series having much higher molecular weights. The latter did exhibit colloidal behaviour and resembled to a remarkable degree, in some of their properties, certain naturally occurring high polymers. The simple polyesters, whose molecular weights ranged from 800 to 5,000 could be called α-esters; the new superpolyesters, ω-esters.

The "molecular still" which was first used by Brönsted and Hevesy (Phil. Mag., 1922, *43*, 31) for the separation of the isotopes of mercury, was redesigned for accomplishing the polymerisation of the simple polyesters. For example, the α-ester obtained from the acid and the glycol was placed in the molecular still and heated in a bath at 200° C. for a total time of 12 days. The viscosity of the molten polyester increased progressively and the final product showed an apparent molecular weight of about 12,000.

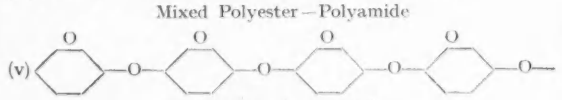
Similar work was done with polyamides. The polyamide prepared by the dehydration of the amino-acid at atmospheric pressure or under diminished pressure in the usual distillation equipment, has an apparent molecular weight of about 1,000 (actual probably about 3,000). This compares with that of the simple polyesters mentioned above. Just as, however, the polyesterification could be forced further towards completion by the use of molecular distillation, leading to the formation of superpolyesters, so a polyamide could be prepared which was harder and tougher than the initial amide.

(i) –NH–R–CO–NH–R¹–CO–NH–R–CO–NH–R¹–CO– . . .
Silk (Polyamide)

(ii) –O–R–CO–O–R–CO–O–R–CO–O–R–CO– . . .
Polyester from hydroxyacid

(iii) –O–R–O–CO–R¹–CO–O–R–O–CO–R¹–CO–O–R–CO– . . .
Polyester from dibasic acid and glycol

(iv) –O–R–CO–NH–R¹–CO–NH–R¹–CO–O–R–CO– . . .
Mixed Polyester—Polyamide

(v) 
Cellulose (polyacetal)

The superpolyesters were capable of furnishing strong, pliable, highly oriented fibres, but as synthetic silk they suffered from the disadvantage of having a low melting point and high solubility in various organic solvents. On the other hand, the polyamide described above was too infusible and too insoluble for spinning; it was in the hope, therefore, of obtaining products which participated in the good qualities of both groups, that it was attempted to obtain mixed products. Varying the quantity of amino-acid with respect to the ester, the solubility and fusion point were varied inversely. The mechanical properties of the products so obtained were better than those of the simple polyesters. The linear condensation products of the α-polyesters and mixed polyesters described above are easily drawn out into very strong, highly oriented fibres closely resembling national silk and cellulose in details of molecular structure.

One phenomenon associated with the formation of fibres from the ω-polymers, moreover, is important. If stress is applied to a cylindrical sample of the opaque, unoriented ω-polyester at just above room temperature, instead of breaking apart it separates into two halves, joined by a thinner section of *transparent, oriented* fibre. As pulling is gently continued the transparent section grows at the expense of the unoriented sections, which are completely exhausted eventually. This "cold drawing" operation is a feature of modern methods for producing "Nylon."

Basis of "Nylon" Production

The actual chemistry of the production of "Nylon" has not been made public, but the progress made from the position described above can be recognised from a study of the Du Pont patent literature in this field, and the basis is probably somewhat as follows:—

Long-chain compounds of a protein nature are produced by the condensation of substances consisting of a carbon chain with an amino-group and a carboxyl-group at the two ends. The carbon chain is shortest in glycine, $NH_2.CH_2.COOH$, whilst 9-amino-nonanoic acid, $NH_2(CH_2)_8COOH$ affords a more complex example. Condensation in the case of glycine occurs as follows:—

$$NH_2.CH_2.COOH + NH_2.CH_2.COOH \longrightarrow NH_2.CH_2.CO.NH_2.CH_2.COOH + H_2O$$

The glycyl glycine resulting from the condensation of two molecules of glycine (with elimination of water) is very similar in structure to the original glycine in so far as it has an amino- and a carboxyl-group as terminals. Thus is opened the possibility of condensing two molecules of glycyl glycine to give a more complex body which, however, still has terminal groups favourable to further condensation.

Another method whereby similar substances can be produced is by the condensation of molecules of a substance consisting of a chain of carbon atoms, with an amino-group at each end, with a similar carbon chain compound having a COOH-group at each end. The condensation of hexamethylenediamine and adipic acid can be represented thus:—

$$NH_2.CH_2.CH_2.CH_2.CH_2.CH_2.CH_2.NH_2 + HOOC.CH_2.CH_2.CH_2.CH_2.COOH \longrightarrow NH_2.CH_2.CH_2.CH_2.CH_2.CH_2.CH_2.NH.OC.CH_2.CH_2.CH_2.CH_2.COOH.$$

Again it is evident that the product can condense further with itself or with another long-chain compound having amino- and carboxyl- terminal groups similar to itself, the properties of the final product being determined by the conditions under which the condensation is carried out.

The new "Nylon" yarn of Du Pont's is evidently made from complex substances arising from amino-carboxylic compounds such as have been briefly described above. These raw material products are brought into a molten condition by heating to about 200° C, being then extruded through relatively *coarse* jets, but being thereafter subjected to a "cold drawing" treatment based on the principles of the orthodox "stretch spinning" known to the rayon industry. This final

process causes a necessary loss of ductility but a large increase in the opposite quality, namely, elasticity.

" Nylon " does not exhaust the list of " practical " yarns of a synthetic or artificial nature introduced during 1939, although it is outstanding from the point of view of interest. Mention may be made, for instance, of " Vinyon," an interesting fibre derived from a vinyl resin and sponsored by the American Viscose Corporation. This is a copolymer of vinyl chloride and vinyl acetate which is thermoplastic at temperatures above 150° F. Another yarn, also originating in America, has been evolved from chitinous substances; whilst in our own country there has been developed an entirely new yarn for which a definite future may be predicted. The process utilises alginates, which are squirted through spinnerets into coagulating baths; sodium alginate, for instance, being extruded into $CaCl_2$ or an acid such as H_2SO_4 which converts the sodium alginate into insoluble calcium alginate or alginic acid.

Bleaching Process for Linen

As to the processing side of the textile industry during 1939, it is likely that first place for interest will be held by a new bleaching process for linen, developed by chemists in association with Imperial Chemical Industries, although the achievement owes more to the application of the principles of physical chemistry than to those of pure chemistry. Intensive investigation of the bleaching of bast fibres, especially linen, led to the new patented process, which has proved successful on a commercial scale and which is being taken up widely by bleachers of these materials. The objects of the process are to standardise the conditions, improve the bleach, and avoid the frequently unexplained results of chemical degradation and loss of strength of yarn and fabric. By the new process, any degree of whiteness can be attained on flax yarn or linen, by operations which are more rapid and convenient, keeping the alkali " solubility number " (a measure of the degradation of cellulose) less than 5 or even less than 4.

The process, after the preliminary alkaline scour, which has the object of ensuring rapid and uniform wetting-out, consists of two stages, in which the materials are treated with a hypochlorite solution maintained within a substantially neutral *p*H range by a buffer salt, and then a second stage or stages with an alkaline solution of an oxidising bleaching agent, preferably one of hydrogen peroxide. The *p*H of the hypochlorite solution is kept within the desired range (approximately neutral) usually by sodium bicarbonate, which has the correct buffering characteristics. The liquor is kept down, for example, to an available chlorine content of 2.5 to 3 grams per litre using about 8 grams per litre of bicarbonate. The time and the temperature of the hypochlorite bath are not unduly critical. If, however, a high white is desired, with minimum chemical degradation, time, temperature and other factors must be carefully controlled. The scour can range from relatively mild, if it ensures thorough impregnation, to severe, and the hypochlorite treatment is inverse in severity.

After the hypochlorite treatment the goods are rinsed in cold water and soured, e.g., in 0.5 per cent. hydrochloric acid for half an hour, and thoroughly washed in cold water. Then the goods are treated with the alkaline peroxide solution made up in the usual way (or by a patent method in which sodium peroxide and sodium carbonate are dissolved in the required quantity of water). The permissible range technically can be from about 0.15 per cent. Na_2O and 0.05 per cent. H_2O_2, to 0.4 per cent. Na_2O and 1 per cent. H_2O_2. Temperatures are 60°—75° C. for 3 hours.

Rubber on Wool Fibre

A further technical development that may have far-reaching influences on the treatment and finishing of textiles was made known during 1939. This was the deposition of rubber on to the wool fibre. There were four possible processes of application, and the one originally evolved was the subject of B.P. 483,496. For this, the wool is treated with a cationic soap, dried if required, and then treated with normal alkaline latex, the particles of which carry a negative charge. Exhaustion of the latex bath occurs as the rubber is deposited on the fibres.

The disadvantage here is that it is a two-bath process, and B.P. 497,793 is designed to overcome this. Here the latex is treated with the cationic soap under prescribed conditions so that the particles carry a positive charge in alkaline solution. When wool is immersed in this latex, deposition of the rubber takes place to approximately 100 per cent. exhaustion. For really satisfactory behaviour the rubber applied to textiles must be vulcanised, so that the dried or deposited rubber is already vulcanised.

A process for rubberising wool has been evolved consisting in the deposition or precipitation of rubber on to the fibres from dilute rubber latex, the rubber being taken up in a manner analogous to a dyestuff, with exhaustion of the dispersion in the bath. To achieve this, natural latex is modified by the addition of cationic soap compounds so that the charges on the particles is reversed. Normally, 5-15 per cent. of rubber by weight is applied to the textile, although in some instances a higher percentage may be advantageous.

The chief property that the rubber (which is present as a partial coating of the fibres and not as a continuous film throughout the yarn or fabric) confers, is that of binding or locking the fibres together and reducing their ability to move. In a soft-twist yarn, breaking normally occurs by slippage of the fibres over one another. The presence of the rubber reduces this slip and increases the strength till it may exceed that of a hard-twist yarn. But whereas the hard-twist yarn has lost to a large extent its fullness and loftiness, the rubberised soft-twist yarn of the same strengh has not.

The evolution of textile auxiliary or " assistant " products is one field which may always be depended on to provide evidence of progress, and numerous new products made their appearance in 1939, although none of the commercially successful ones could be termed revolutionary. A *significant* development, however, may be mentioned in conclusion.

Uses of " Calgon "

Dyers and finishers, during the past few years, have found sodium metaphosphate (" Calgon " is the familiar trade name in this connection) of considerable assistance in dispersing lime soaps which can be a formidable source of trouble in common operations. " Calgon," added to hard water, prevents the formation of lime soap scums, but on the large scale it has been found that it is deficient in that detergent power which made the sulphonated higher fatty alcohols (also fairly good dispersants of lime soaps) so useful. An attempt has therefore been made to combine the two types of product.

Metaphosphoric acid $(HPO_3)_n$, n representing 3 or more, forms salts by heating with other phosphates such as monosodium phosphate (NaH_2PO_4) or disodium pyrophosphate ($Na_2H_2P_2O$) to 600 or 700 ° C. If one or other of these polymeric metaphosphoric acids is reacted with an organic compound which has a hydroxyl group, there is formed a water-soluble compound which is very stable in hard water and which has certain wetting and detergent powers. It does not seem possible to use sulphonated fatty alcohols as suggested above, but related substances such as vegetable oils and alcohols (castor oil, oleyl alcohol) can be used. The method of making the new products is as follows:—

A mixture of 240 parts of castor oil and 440 parts of anhydrous hexametaphosphoric acid is kneaded together, whereby the temperature gradually rises to 40° C. and the whole becomes soluble in water. Then, 440 parts of water are gradually introduced and the product allowed to cool and settle. The metaphosphoric acid ester rises to form an upper layer, and this is withdrawn and neutralised with 250 parts of concentrated ammonia; in this way an oil product is obtained which is reported to be very useful in wool dyeing, since it has high wetting-out power, and is very stable in hard water.

Efficient Use of Pool Oils

Residuals Instead of Distillates—Plant Improvement

A PAPER presented to the Institute of Fuel last Thursday by N. L. Hudson, R. J. Bressey, and T. C. Bailey, contained interesting and important details about the pool grades of Gas, Diesel, and Fuel Oils and their efficient utilisation in oil-burning installations. The lecturers explained how, under war conditions, it became necessary to reduce to the absolute minimum the number of grades of oil sold, with a result that four broad standard qualities are now available: Pool Gas Oil, Pool Diesel Oil, Pool Fuel Oil, and Pool Heavy Fuel Oil, with approximate characteristics as in the table below:—

	Pool Gas Oil.	Pool Diesel Oil.	Pool Fuel Oil.	Pool Heavy Fuel Oil.
Composition	Distillate	Distillate	Residual oil or Blend.	Residual oil or Blend.
Flash Point (closed)	150° F. minimum	150° F. minimum	150° F. minimum	150° F. minimum
Viscosity Redwood I. at 100° F. ..	35 secs.	40 secs.	220 secs.	950 secs.
Pour Point (maximum) ..	20° F.	20° F.	35° F.	—
Gross Calorific Value B.Th.U.'s per lb. ..	19,600	19,350	18,900	18,750

As the authors point out, it is now obviously of national importance, as well as of individual interest, to practise fuel economy in the broadest sense of the term, both by converting existing oil-burning plant to use a heavier and cheaper grade, and by improving the efficiency of such plant. It is worthy of note, when considering the first method, that the price differentials between the four Pool Grades have altered considerably since the outbreak of war. Whereas there was no schedule differential between fuel and heavy fuel oil pre-war there is now a differential of ½d. per gallon, equal to about 11s. per ton, and that whereas before the war the schedule differential between residual oils and distillates was ¾d. per gallon the margin between the extreme grades has now widened to 1¾d. per gallon. There is thus an *increased* incentive to burn a residual oil rather than a distillate, and a *new* inducement to use heavy fuel oil rather than fuel oil. These factors will, no doubt, have the serious consideration of all consumers who wish to economise.

As regards the conversion of existing plant to use a heavier grade of oil, there are several factors to be considered, including the type and make of oil burner, the air pressure required, and the proper arrangements for the storage and handling of the oil itself. The present paper deals only with the last aspect, and in addition to detailed treatment of the subject in the text of the paper, the necessary information is arranged, under convenient heads, in an appendix.

The authors express their diffidence in including a section on improving the efficiency of existing plant, virtually one of the first principles of fuel economy. They are justified, however, in their opinion that there are still many works in which fuel (solid and gaseous as well as liquid) is not utilised as efficiently as it might be, and if their notes should find their way into some of these works, and thereby help to spread the gospel of fuel economy, they will certainly have served a useful purpose.

Excess air is a most common cause of fuel wastage, and the authors show how economies can be effected by ascertaining the amount of excess air, by utilisation of waste heat, and by preheating the air. Radiation losses can be kept down to a minimum by the use of suitable modern insulating refractories—not forgetting the furnace floors. The formation of carbon in combustion chambers is another sign of uneconomic conditions, indicating that either a readjustment of the burner or a redesigning of the furnace brickwork is needed. Many industrialists, too, would be well advised to consider increasing the number of their furnaces, in order that each one may be designed for as narrow a range, either of temperature or output, as possible.

Melamine

A New Industrial Raw Material

MELAMINE, or 2,4,6-triamino-1,3,5-triazine, is a derivative of cyanamide which has been recently brought to the stage of commercial production by Continental firms and offers many points of interest to the plastics, textiles and furniture industries. Moulding powders based on melamine-formaldehyde condensation products have been introduced under the names of Melopas (Switzerland) and Ultrapas (Germany). Owing to their chemical inertness towards unchromed steel, the cost of moulds to be used in conjunction with these powders is considerably reduced. Melamine plastics can be moulded at a much higher temperature than the rather similar urea plastics, so that an appreciable increase in output can be achieved. Other advantages of melamine plastics are their glass-like transparency and their high resistance to heat and moisture.

Under certain conditions melamine condenses with formaldehyde to give water-soluble intermediate products, the applications of which have been described in a series of patents. These intermediates are readily insolubilised by brief heating and are therefore of particular interest to the textile, laminated paper and plywood industries. Creaseless fabrics are now reported to be made in Italy by impregnating with an aqueous mixture of melamine and formaldehyde and drying at 150° C. Glue or casein substitutes for plywood and veneers have been introduced on a melamine basis for both hot and cold process work and have the advantages of being odourless, colourless and free from alkalinity.

Sulphite Recovery

From Exhausted Liquors of Wood Pulp Treatment

A METHOD for the recovery of sulphite and waste organic matter from the exhausted liquors of wood pulp treatment is described by Howard (Chem. Met. Eng., 1939, *46*, 10, 618-619). The process is a three-stage one, in which the waste liquors are first strained free of undissolved fibres, then treated with an amount of lime experimentally determined as sufficient to precipitate only calcium sulphite, which is filtered off; then more lime added to the filtrate to precipitate the organic matter in solution, which is mainly lignin sulphonic acid, and is thrown down as the basic calcium salt, which again is filtered off. The filtrate has a biological oxygen demand of one-fifth that of the initial liquor, a point of great importance when the pollution of streams by factory waste liquors is a very urgent consideration.

The calcium sulphite recovered is used as a source of fresh cooking acid. The basic lignin sulphonate has found a variety of applications. After dewatering to a moisture content of 50 per cent. it can be burned with an addition of 10 per cent. of coal screenings in a water tube boiler, with a thermal efficiency of about 70 per cent. Either as the wet filter cake or in the dry form it has found further applications as a raw material in a number of industries, *e.g.*, in the manufacture of vanillin, in dispersing agents, and in plastics; and large quantities are used as assistants for tanning leather, treating boiler water, and also for improving cements.

Chemical Matters in Parliament

The Application of Science to War

IN the House of Lords last week interesting information on the application of science to war was given by Lord Chatfield. He stated that the vital importance of scientific research to war was and had been fully realised and that the country's scientific talent had been mobilised to that end. Joint committees of the fighting Services considered many scientific subjects which were of common interest and inventions were brought under expert eyes with the least possible delay. The Government had rejected, however, a proposal to set up a central body since in their view that would be likely rather to impede than to expedite progress. Apart from inter-Service contacts there were scientific and technical committees which covered every kind of research work. Their work, Lord Chatfield said, must necessarily be secret, but he was able to give the assurance that, so far, any surprise or partial surprise disclosed in the struggle had been rapidly met by our present methods. He also indicated the scope of the mutual exchange of scientific knowledge which had taken place between the British and French Governments before the war, and said that the question of extending the present liaison was being discussed.

Lord Chatfield added that measures were to be taken to reward and protect those persons whose inventions the Government had accepted. Finally, he said that the organisation of science in relation to war was adequate to our purposes so far as these could now be foreseen.

Oil from Coal

In the House of Commons last week Mr. Grenfell asked the Secretary for Mines whether his Department was prepared to give technical assistance to promoters of oil from coal processes; and whether such facilities as exist in Government testing stations were available for ascertaining the commercial prospects of any method put forward as a means to ensure a supply of oil within this country.

Mr. Lloyd stated, in reply, that the technical experience of the Fuel Research Station of the Department of Scientific and Industrial Research was already held as freely available as possible for this purpose. The Department of Scientific and Industrial Research was also prepared, in accordance with its published scheme, to test, free of charge, plants for low temperature carbonisation which were of such a size that their performance would be comparable with that of similar plants operating on a commercial scale. The report of any such test provided technical information on which the promoters of the process and others interested would, from their experience, form their own estimates of its commercial prospects, which must, of course, take into account other than purely technical considerations.

Mr. Grenfell asked the Secretary for Mines whether his Department had considered the adoption of a plan for the production of oil, gas and carbonised fuel from coal on a scale sufficiently large to lessen the demand for shipping tonnage for the importation of liquid fuel from abroad.

Mr. Lloyd : I am in communication with the hon. Member on this matter.

Later in the same day came a debate of over an hour on the motion for the Second Reading of the Gas and Steam Vehicles (Excise Duties) Bill. Mr. Bernays (Parliamentary Secretary, Ministry of Transport) pointed out that the Bill provided for the removal of the burden of extra taxation in respect of weight of gas plant or goods vehicles using producer-gas for fuel, in pursuance of the national fuel economy campaign; but Members asked for further concessions in view of the expense involved in converting engines and because of the patriotic nature of the service. Captain Margesson (Parliamentary Secretary, Treasury), therefore, acceded to the suggestion that the Committee stage of the Bill should be postponed till the following week.

Letters to the Editor

Support for Inventors

From Sir Arrol Moir, Bt.

SIR,—During the last War invention was one of the key industries of the country and is still more so to-day, both for the promotion of victory and for the speedy revival of trade afterwards.

I am anxious to make it known, therefore, that inventors with ideas of any kind, either for the fighting services or for peace time trade, will be given full support by the Institute of Patentees if they will apply by letter and state the nature of their work.

Our object is to collect " war " and other inventions which may be of use to the country and launch them by submission to the proper authorities and firms, as this organisation has for its primary purpose the protection of inventions, and we are ready to give them every assistance in carrying out their aims of national importance. Inventions of any kind, however simple, are welcome and they will receive the earnest attention of a competent technical committee.—Yours faithfully,

A. MOIR,
Vice-President, Institute of Patentees.

London, S.W.1, January 23.

Ministry of Supply Contracts

Work for Smaller Firms

CERTAIN persons purporting to have special facilities for approaching the Ministry of Supply and obtaining contracts are offering their services to smaller firms as intermediaries on a commission or subscription basis. The Ministry of Supply again desires, in the public interest and in the interest of these firms, to state that anyone wishing to be considered for Ministry contracts is free to apply direct to the Ministry or to the Area Officers of the Ministry, and that all such applications are dealt with on their merits. There should, therefore, be no necessity to employ intermediaries who, in return for a financial consideration, represent themselves as being able to influence contracts.

The Ministry's aim is to make as full use of small firms as possible consistently with the efficiency and speed of production essential at this time in the national interest, but it is considered that small firms usually would be most useful as sub-contractors to main contractors, since it is not possible for many of the smaller firms to undertake complete manufacture of the various munitions which are required. Groups of small firms may usefully be ranged under a parent firm to form units large enough to undertake complete contracts. Several such groups of firms have, indeed, been formed.

To assist firms, and particularly smaller firms not now engaged in munitions production, the Ministry some time ago arranged samples of munitions stores at convenient centres throughout the country. Officers of the Ministry are in attendance at these centres, and firms wishing to inspect the stores and be advised in respect of their manufacture are free to make appointments direct without the intervention of intermediaries.

Sample rooms at which munitions stores may be inspected, upon application to the Area Officer concerned, are at King Edward House, New Street, Birmingham; 11 Piccadilly, Manchester; 141 Bath Street, Glasgow, C.2; Queen's Buildings, Queen Street, Sheffield; Sherwood Buildings, Sherwood Street, Nottingham; 32 Baldwin Street, Bristol; 41 Sidney Street, Cambridge; 4 St. Nicholas Buildings, Newcastle-on-Type; and Savoy Hill House, London, W.C.2.

Firms desiring to see samples should write in the first instance to the Ministry of Supply Area Officer at one of the addresses given, who will issue cards of admission.

Recent Trade Literature

A new indicating temperature controller, manufactured by GEORGE KENT, LTD., is described in a folder recently issued by the company. This instrument is an extension of the company's Multelec potentiometer range and is designed for use with heat treatment plant where a temperature record may not always be required. "On and off" or two-position and three-position control mechanisms are available with this new instrument which embodies all the fine points of the recording Multelec.

END RUNNER MILLS CO., LTD., Ashbourne, have issued an illustrated catalogue of end runner mills with single and double runners, crushers and grinders for laboratory and assay room and mechanical sifters. The end runner grinding and mixing mills are in effect mechanically operated pestles and mortars. The pestle (runner) is set eccentrically and is driven by friction from the mortars, thus giving two speeds with consequent rapid reduction, or in the process of mixing, perfect amalgamation of materials. The pestle is hinged in the smaller mills or raised by a lever in the larger ones, to facilitate emptying and cleaning.

BAKER PLATINUM, LTD., LONDON, have issued an interesting booklet entitled "Platinum Metals and the Chemical Industry." The purpose of this publication is to discuss the advantages of the use of platinum and platinum clad by industry and to touch briefly upon some of the outstanding applications of this heat and corrosion resistant metal. It is pointed out that the use of platinum in chemical processes is almost as old as the chemical industry itself, and the performance records established by numberless platinum equipment parts have, it is claimed, thoroughly demonstrated the efficiency, the commercial practicability and the ultimate economy of this metal. Various examples of the application of platinum in the chemical industry are quoted in support of the latter statement.

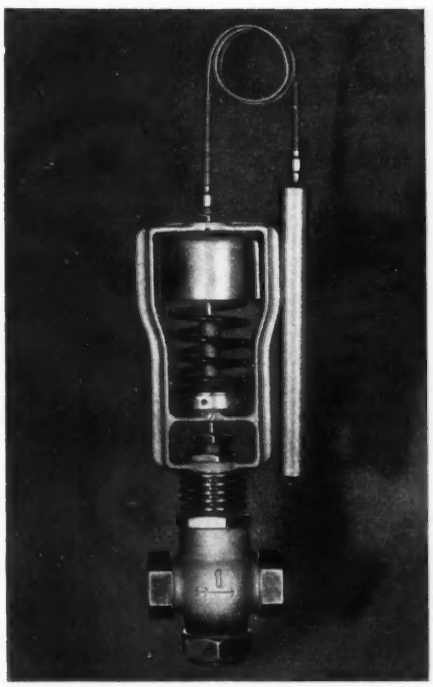
The Dextrae industrial unit, manufactured by ADAM HILGER, LTD., is described in a booklet recently issued by the company. It is stated to be a mobile X-ray unit complete with demountable, multi-target, hot cathode X-ray tube, transformer, pumps and camera equipment for the study of the metallurgical conditions of metals and alloys such as cold work and preferred orientation and for the examination of refractories, slags and other materials. Estimation of the value to industry of a new method of analysis is difficult because past experience has shown that a new method tends to supplement existing ones. X-ray analysis is, however, unique in that it supplies information which in many cases could not have been obtained by any other means and in others provides an entirely new and more fundamental form of approach.

About two years ago the RAPID MAGNETING MACHINE CO., LTD., issued particulars of what they claimed to be the largest electro-magnetic drum in the world. They have now issued details of the performance of this drum and also information regarding later developments of this type of equipment which is known as the "Rapid" Patent "Biaflux" electro-magnetic drum. The uses of this type of magnetic drum are legion, it is claimed, for all cases where it is necessary to extract "tramp" iron which inadvertently finds its way into the material to be handled, such as produced in mining and quarrying work. At the same time this particular type of drum has been very successfully applied to the treatment of foundry sands and also for the removal of fine iron in the way of scale that inadvertently becomes contaminated with granulated sugar during the process of refining. In addition many other products can be handled. The world's largest electro-magnetic drum is 36 in. in diameter by six feet wide and was installed at the head of a sugar cane carrier in a large South African mill.

An editorial in the January issue of the *Allen Engineering Review*, published by W. H. ALLEN, SONS AND CO., LTD., announces that 1940 is a milestone in the history of the company, being the Diamond Jubilee year. The issue itself contains articles on the security of unattended power plant, power plant in the laundry, and pumping machinery for the new floating dock at Durban, South Africa.

The current issue of *Alloy Metals Review*, published by HIGH SPEED STEEL ALLOYS, LTD., contains articles on high pressure spindle forging for steam turbine unit in which a turbine spindle of exceptional size is briefly described, welded carbon-molybdenum steel plate for oil refinery reaction chambers, new high-speed steels and the development of a new type of stainless steel clad carbon-molybdenum plate. Brief reviews are given of the numerous changes that have occurred in the applications of vanadium during the past ten years.

In air-conditioning practice it is often necessary to control the flow of steam or water in order to maintain predetermined conditions of temperature or humidity. For example, the steam supply to vaporisers used in humidity control and the cold-water supply to unit coolers in dew-point controlled systems must be so governed. Thermostatic steam or water valves suitable for this service and for the automatic control of a wide range of industrial heating processes involving comparatively small flows are described in a new technical



A Teddington 1" thermostatic steam or water valve.

bulletin (Publication 358A) just issued by the BRITISH THERMOSTAT CO., LTD. "Teddington" Model PCV thermostatic valves are operated by a seamless metallic bellows connected by capillary tubing to a phial charged with a volatile liquid and exposed to the temperature to be controlled. Change of temperature produces a corresponding change of pressure within the charged system, and the bellows expands or contracts in sympathy, closing or opening the valve against spring pressure. The bulletin contains full information regarding performance, and dimensions, and useful notes on application and installation.

PERSONAL NOTES

MR. W. A. N. MARKWELL, A.I.C., F.C.S., has been appointed chief chemist and manager of William Ransom and Son, Ltd., manufacturing chemists, Hitchin.

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MR. F. BAER and MR. H. C. STREET have been appointed by the Minister of Supply to serve on an advisory committee to the Non-Ferrous Metal Control, to consider matters connected with the Control's operations in the U.K.

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SUB-LIEUT. G. WARDLE, a member of the crew of the submarine *Starfish* which was among those recently posted as missing by the Admiralty, is a son of MR. G. C. WARDLE, chairman of Joshua Wardle, Ltd., weighters, dyers and finishers, Leekbrook, Leek, Staffordshire.

OBITUARY

MR. LEONARD LEAROYD, a director of Lustre Fibre, Ltd., a subsidiary of Courtaulds, Ltd., was among those killed when a passenger 'plane crashed into the sea near the island of Bali this week. He was 48.

* * * *

MR. JOHN FULTON, chairman of William Fulton and Sons, Ltd., dyers, Glenfield, Paisley, died last week aged 69. Mr. Fulton had been associated with the firm for nearly 50 years. He was appointed a director in 1896, and in 1918 he succeeded his father as chairman of the firm.

MR. W. F. MERRITT, a director of Stafford Allen and Sons, Ltd., manufacturing chemists, London, N.1, has left estate valued at £73,179 (net personalty £68,107).

General News—From Week to Week

ARRANGEMENTS HAVE BEEN MADE to hold the annual meeting and dinner of the Society of Dyers and Colourists at the Victoria Hotel, Bradford, on Friday, March 8.

ACCORDING TO THE BOARD OF TRADE returns for the month ended December 31, 1939, imports of chemicals, drugs, dyes and colours into the United Kingdom were valued at £1,469,446, an increase of £538,484 compared with December, 1938. Exports were valued at £2,487, an increase of £849,522. Re-exports were valued at £35,745.

THE NEXT MEETING of the Society of Public Analysts and Other Analytical Chemists will be held jointly with the Food Group of the Society of Chemical Industry, on Wednesday, February 7, at the Chemical Society's Rooms, Burlington House, Piccadilly, W.1, at 2.15 p.m. The following papers will be read: The Constitution and Physiological Significance of Carotene and Allied Pigments (R. A. Morton, D.Sc., F.I.C.), and The Commercial Determination of Carotene and Allied Pigments, with especial reference to Dried Grass and other Leafy Materials (W. M. Seaber, B.Sc., F.I.C.).

A GENERAL MEETING of the Mineralogical Society was held at Burlington House, Piccadilly, W.1, on Thursday. Among the papers read were those on the following subjects: The structure of orthoclase (Dr. S. H. Chao, Mr. A. Hargreaves, Dr. W. H. Taylor); The existence of reversible photosensitivity in some artificial materials containing rutile (Dr. W. O. Williamson); Notes on the occurrence of fluorite in the West Cumberland iron mines and in the Lake District of Cumberland and Westmorland (Mr. Arthur Russell); and A note on crystallographic calculations (Dr. Max H. Hey). General meetings of the Society during 1940 will be held in the apartments of the Geological Society of London, Burlington House, Piccadilly, W.1 (by kind permission) on the following Thursdays: March 7, June 6, November 7.

WHEN THE INQUEST was resumed at Leicester last week on two men who were killed by an explosion at the works of John Richardson and Co., Ltd., manufacturing chemists, the foreman of the pillroom, in which the explosion took place, said that on January 2 one of the deceased put in a requisition for some potassium chlorate and borax. When it was taken from the drying-room it was not suitable and was sent back. When it came back again it should have been granulated, so that tablets might be made, and this should have been done by passing it through a sieve. There was a granulating machine in the room, working under pressure, but Hall had been told not to put the potassium chlorate through the machine, as there was a danger of explosion. The explosion blew the granulating machine to pieces, and when search was made for the potassium chlorate and borax compound it could not be found. Witness assumed that the man put the material through the granulating machine, possibly to save the time that it would take to put it through the sieve, and that this caused the explosion. Mr. Andrew Fotheringham, Inspector of Factories, agreed that the theory put forward was one that would account for the explosion. A verdict of "Accidental death" was returned.

IN THE NATIONAL CERTIFICATE examinations of the Liverpool Technical College thirty-three candidates were awarded senior certificates for chemistry (endorsed by the Institute of Chemistry), and ten, advanced certificates.

AT A MEETING of the Oil and Colour Chemists' Association held in Manchester recently, a paper on "Discolouration of Paint caused by Mould Growth, and its Prevention" was presented by Mr. W. P. K. Findlay.

THE EXTENSIONS to the Huddersfield Technical College are nearing completion, and will, it is expected, be opened in May or June, by Lord McGowan, chairman of Imperial Chemical Industries, Ltd.

THE NEXT MEETING of the Midlands centre of the Electro-depositors' Technical Society will take place on Tuesday, February 6, at 6.30 p.m., at the James Watt Memorial Institute, Great Charles Street, Birmingham, 3, when a paper on "The Production of Perfect Nickel Plating" will be presented by Dr. S. Wernick. The chair will be taken by Dr. H. Saenger.

"THE BRITISH CHEMIST IN INDUSTRY—THEN AND NOW (1914-1939)" was the title of an address delivered at a meeting of the Nottingham section of the Society of Chemical Industry, on January 18, by the chairman, Mr. Harold Calam. Mr. Calam pointed out that the position in which the British chemist in industry found himself to-day rested on the success of his efforts during the last war and the developments which had taken place in the intervening period.

CHEMICAL ACTIVITIES IN LIVERPOOL.—The fourth joint meeting of local sections of chemical organisations in Liverpool was held on Thursday under the auspices of the British Association of Chemists. A paper entitled "Microchemical Methods" was delivered by Mr. W. Doran, of Liverpool University. The Liverpool section of the Society of Chemical Industry will hold its annual joint meeting with the Manchester section in Reece's Parker Street Restaurant, Liverpool, on February 2, when a Jubilee Memorial Lecture will be delivered by Sir John Orr entitled "The Chemical Aspects of Nutrition as Applied to Animals and Human Beings." The annual meeting of the Liverpool section of the S.C.I. will be held on March 14.

THE CORNISH CHINA CLAY INDUSTRY enjoyed a fair measure of prosperity throughout 1939, despite abnormal conditions for trading. Although the outbreak of war brought to an end Germany's considerable demand for china clay and affected other Continental markets, the American market and home trade have both improved. The satisfactory position of the industry is largely due to the fact that many more uses have been found for china clay since the last war and the scientists of china clay firms have been to a great extent responsible for the extension of the demand. They have found, and are constantly developing, new channels for the application of china clay. During December, 1939, shipments of china clay totalled 69,039 tons. For the whole year the aggregate trade amounted to 804,620 tons, compared with 700,870 tons in 1938, and 970,006 tons for the peak year of 1937.

THE NEXT THREE CANTOR LECTURES of the Royal Society of Arts are being delivered in the rooms of the Society, John Adam Street, Adelphi, London, W.C.2, on Monday afternoons, January 29, February 5 and February 12. The lecturer is Dr. C. H. Desch, F.R.S., and his subject is "Metals as Engineering Materials."

CONSIDERABLE DAMAGE TO STOCK was caused by a serious outbreak of fire which occurred on Monday at the works of the British Oil and Cake Mills, Ltd., at the James Watt Dock, Greenock. Four large tanks filled with cotton oil were threatened when part of the oil became ignited. Using chemical foam apparatus the firemen, after four hours' work, managed to subdue the outbreak.

ONE MAN WAS FATALLY INJURED, and three other workers and a fireman were burned on Monday when fire, followed by an explosion, broke out at a tar still in the Provan Chemical Works, Glasgow, belonging to Glasgow Corporation. The men were working in a pit which was to hold the still, when some tar nearby caught fire. Immediately afterwards there was an explosion which hurled flaming tar over the immediate vicinity. Detachments of the Glasgow Fire Brigade, with the aid of chemical extinguishers, quickly had the outbreak under control. One fireman was burned as a result of ammonia squirting back upon him.

Foreign News

PHOSPHATE OF LIME EXPORTS from the Gilbert and Ellice Islands to countries outside the British Empire is now prohibited except under licence.

AT NEWNES, NEW SOUTH WALES, the Commonwealth Council for Scientific and Industrial Research are exploiting shale deposits and expect, as from January 1, to obtain petrol at the rate of at least 10,000,000 gallons per annum.

BERYLLIUM AND ITS ALLOYS are now being produced on an extensive scale at Chiavasso by an Italian patented process. The alloys include those with aluminium, copper and magnesium. Thanks to their exceptional lightness and resistance to marine corrosion, the aluminium-beryllium alloys are of exceptional importance in aircraft and submarine manufacture.

A PROCESS FOR the manufacture of metallic magnesium from seawater salts has been evolved by an Italian engineer and is based, as reported in *La Chimica e L'Industria* (December, 1939, 693), upon preliminary isolation of a magnesium chloride solution which is eventually electrolysed to give magnesium and chlorine.

SEVERAL REPERCUSSIONS of the war upon the Japanese chemical industries have been recently reported. The plans of the Imperial Fuel Industry Company for establishing a coal hydrogenation plant at Wakomatsu have been upset because the German Lurgi concern which was acting as technical advisers in the erection of a tar hydrogenation unit has announced that no assistance can be expected from German sources for the duration of the war.

SINCE THE MANUFACTURE of all soaps in Germany has become standardised, the marketing under brands has been discontinued and all types are being sold without the identifying marks of the manufacturer. American consular reports indicate that standardisation has involved considerable changes in manufacturing costs, which has necessitated changes in market prices. Producers not able to manufacture at a profit under the new price schedule will not be supported by the Government and are expected to withdraw from the field.

WITH THE INSTITUTION of the British naval blockade, research in Germany into the possibilities of obtaining substitute technical fats has been intensified. The most promising field appears to be in the production of synthetic fatty acids from paraffin by means of air-oxidation. According to an American consular report, published in *World Trade Notes*, the German Reich patent 626787 referred to the transformation of paraffin into fatty acids and the establishment of a pilot plant giving a satisfactory result, indicating that Germany had deveolped a commercial production of synthetic fatty acids from paraffin hydrocarbons. The large plant in the Ruhr, completed in 1936, is reported as having been successful. Plans are now in hand to enable Germany to produce sufficient paraffin annually to yield 30,000 to 40,000 metric tons of synthetic fatty acid. Germany's normal consumption of technical fats is estimated to be between 350,000 and 400,000 metric tons per annum, of which between 60 and 70 per cent. goes into the manufacture of soaps, and 17 per cent. into the paint industry.

A DECISION to extend the Brazilian castor oil industry has resulted in a special credit being opened for the Institute of Technical Research in Sao Paulo to enable studies to be made of the manufacture of castor oil on a large scale.

THE EXPORT OF NAPHTHALENE is being developed to a substantial degree in Italy. Shipments to the end of July, 1939, totalled 143 metric tons against 80 metric tons for the period January to July, 1938. Italian possessions in Africa received the greater part of these exports.

EXPORTS OF VANILLIN from France during the first half of 1939 amounted to 517 metric quintals valued at 4,320,000 francs. Of these 318 quintals (3,974,000 francs) went to foreign countries and 199 quintals (346,000 francs) were exported to French colonies. In the corresponding period of 1938 total vanillin exports from France reached 443 metric quintals valued at 4,373,000 francs, of which 327 quintals (4,194,000 francs) went to foreign countries and 116 quintals (179,000 francs) were exported to French colonies.

THE FRENCH GOVERNMENT AUTHORITIES have ordered the industrial utilisation of waste of all sorts, and all stocks of waste must be declared. In the chemical industry this chiefly affects the industrial applications of sulphur and sulphuric acid in the coke factories and gasworks. The treatment of lignite and peat should lessen petroleum imports; lubricating oils are to be regenerated, and volatile solvents, benzol and fatty substances recovered. The import and utilisation of fats in industry is now controlled by law, and finally, the valuable elements contained in smoke and dust are to be recovered.

SINCE THE OUTBREAK OF WAR the Norwegian cod-liver oil market has been upset by the inability of exporters to obtain enough oil from producers to fill current orders, the demand of long-term contract holders for immediate delivery, and the scarcity of shipping. There is also some apprehension in the trade as to what action the Government may take to regulate the industry. Some fear that the Government may licence export orders and others state that if the transport situation becomes acute, making it difficult for the country to obtain sufficient food fats, domestic cod-liver oil may be held for local consumption.

ACCORDING TO A REPORT published by the Industrial Research Bureau of the Indian Stores Department on the recovery of titanium oxide from the mud residue of Indian bauxite utilised in the manufacture of aluminaferric, Indian bauxite contains from 9 to 12 per cent. of titanium, a material which has never been recovered previous to the development of the process. The recovered titanium dioxide is reported to be from 98 to 99 per cent. pure with only a trace of iron. Based on the experimental process the cost of producing titanium oxide is 35 rupees per hundredweight as compared with the domestic market price of titanium oxide of 56 rupees per hundredweight.

THE RESULTS OF A STUDY, by C. A. Fort and N. McKaig, Jr., of the crusher juices of eight sugar-cane varieties grown on different soils in Louisiana, have just been published in booklet form by the U.S. Department of Agriculture, Washington, D.C. The data presented permit a comparison of the different varieties on the basis of many of the non-sugar substances, both mineral and organic, which together form approximately 7 to 10 per cent. of the total dry solids in the juice. Determinations were made for apparent and true solids, apparent and true sucrose, acidity, *p*H value, reducing sugars, ash, Si, Ca, K, Na, Mg, Al, Fe, Mn, S, Cl, P, total and protein N, and gums. Calculated values are also shown for total non-sucrose, total non-sugars, true and apparent purity, approximate organic acids, non-protein nitrogen, and salts.

THE RECENT ANNUAL REPORT of the National Federation of Hungarian Chemical Industry notes a satisfactory increase in Hungarian oil production, which already covers half the home demand. A still further increase was shown in natural gas production. The acquisition of the Carpathian district meant an important enrichment of the chemical industry; the wood resources of the Carpathian forests supply three wood distillation plants and a cellulose factory. Although the plans for the erection of new artificial silk and cellulose factories fell through, the State factory for the working of aluminium ore at Gaat and the aluminium factory of the Hungarian General Coal Mining Company are under construction. An oil cracking plant has been erected at Pét. The Hungarian Fertiliser Factory has erected plants for the production of hydrogen peroxide, compressed sulphuric acid, and liquid chlorine. The Pét Nitrogen Factory has taken up production of trichlorethyl, and the Salgótarján Coal Mining Company phenol and cresol.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

MANUFACTURE OF CATALYSTS.—Anglo-Iranian Oil Co., Ltd., H. F. Dare and A. Millien. 32810.

SUCTION GAS-PRODUCER PLANTS for motor vehicles.—T. H. Barton. 32757.

CHROMIUM-CONTAINING AZO DYESTUFFS.—Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimiques du Nord Rennies Etablissements Kuhlmann. (France, Jan. 21.) 32858.

MANUFACTURE OF ALIPHATIC COMPOUNDS.—H. Dreyfus. 32641.

PROCESS FOR THE MANUFACTURE of derivatives of [1, 3, 5-triazinyl-(6)]-aminophenyl arsenic acids.—E. A. H. Friedheim. (Switzerland, Dec. 23, '38.) 32910.

MANUFACTURE OF ACTIVE CHARCOAL.—Gas Light and Coke Co., and S. Pexta. 32771.

PROCESS FOR THE PRODUCTION OF HALOGEN SUBSTITUTED SULPHONIC ACID DERIVATIVES.—J. R. Geigy, A.-G. (Switzerland, Dec. 24, '38.) 32735; (Switzerland, Dec. 31, '38.) 32736.

SEPARATION OF OLEFINS from gaseous mixtures.—H. M. Guinot and Usines de Melle. 32914.

PROCESS FOR THE PREPARATION of a lubricant composed of a mixture of vegetable and mineral oils.—Montecatini Soc. Generale per l'Industria Mineraria e Chimica. (Italy, Dec. 24, '38.) 32730.

PROCESS FOR THE PRODUCTION of hydrocarbons by conversion of carbon monoxide with hydrogen.—H. E. Potts (N. V. Internationale Koolwaterstoffen Synthese Maatschappij (International Hydrocarbon Synthesis Co.). 32671.

PROCESS FOR THE PREPARATION OF STARCH PRODUCTS.—M. D. Rozenbroek and N. V. Chemische Fabriek Servo. (Holland, Dec. 27, '38.) 32920, 32921, 32922.

PURIFICATION OF PETROLEUM PHENOLS.—Standard Oil Development Co. (United States, March 30.) 32903.

METHOD OF DISSOLVING hard and difficultiy soluble resins.—O. Svensson. (Sweden, Dec. 21, '38.) 32705.

PROCESS OF PRODUCING INSOLUBLE POLYMERS.—American Cyanamid Co. (United States, Dec. 30, '38.) 32999.

METHODS OF PREPARING SELF-HARDENING COMPOSITIONS.—American Cyanamid Co. (United States, Dec. 30, '38.) 33000.

METHODS OF PRODUCING INSOLUBLE POLYMERS and products thereof.—American Cyanamid Co. (United States, Dec. 30, '38.) 33001.

THIAZOLINYL SULPHIDE DERIVATIVES.—W. Baird, F. S. Fowkes, G. E. Nettleship and Imperial Chemical Industries, Ltd. 173.

PRODUCTION OF AMMONIUM SALTS OF NITROPHENOLS.—E. Berl. 143.

PRODUCTION OF SOLUTIONS for the manufacture of artificial fibres and artificial fibres derived therefrom.—J. P. Dickson, W. Sever, and Imperial Chemical Industries, Ltd. 107.

CHEMICAL PROCESS.—H. Dreyfus and W. H. Groombridge. 32933.

RECOVERY OF ORGANIC COMPOUNDS.—H. Dreyfus and W. H. Groombridge. 92.

PRODUCTION OF SYNTHETIC RESINOUS COMPOSITIONS.—E. I. du Pont de Nemours and Co. (United States, Jan. 3, '39.) 174.

CONTINUOUS APPARATUS for the manufacture of superphosphates and similar products.—R. Entreprise and J. Moritz. (France, Jan. 6, '39.) 180.

MANUFACTURE OF SULPHONAMIDE COMPOUNDS.—Etablissements Moureyrat and Cie. (France, Dec. 30, '38.) 64.

MANUFACTURE OF AMINO FATTY ACID DERIVATIVES.—J. R. Geigy A.-G. (Switzerland, Dec. 30, '38.) 33042.

MANUFACTURE OF INTERMEDIATE FOR DYES.—Gevaert Photo-Producten N.V., P. de Smet, and W. Mees. 33116.

GAS PRODUCERS.—*J. Gohin.* (France, Jan. 3, '39.) 127.

CHEMICAL REACTIONS.—W. H. Groombridge and R. Page. 91.

PROCESS FOR THE NITRATION of cellulose structures of a lower degree of polymerisation than that of natural cellulose, and production of patterned etching effects using yarns thereof.—Heberlein and Co. A.-G. (Germany, Jan. 5.) 33029.

PROCESS FOR CONCENTRATING LATICES of rubber, guttapercha, and like vegetable resins.—W. I. M. Holman and Revertex, Ltd. 182.

GAS-PRODUCER PLANTS.—W. C. Holmes and Co., Ltd., E. M. Lake, F. B. Holmes and W. Sykes. 32996

PRODUCTION OF RESINOUS SUBSTANCES and their use.—Kodak, Ltd. (United States, Dec. 30, '38.) 33119.

TREATMENT OF TARS, tar oils, etc.—Midland Tar Distillers, Ltd., D. W. Parkes and R. B. Evans. 33045.

PROCESS AND CATALYST for the conversion of hydrocarbons.—A. L. Mond. 32991.

MANUFACTURE OF RUBBER CHLORIDE.—Raolin Corporation. (United States, Jan. 30, '39.) 28.

MANUFACTURE OF HYDROCARBONS by catalytic cracking.—Standard Oil Development Co. (United States, Jan. 28.) 33007.

MANUFACTURE OF RESINOUS COMPOSITIONS.—Titanium Alloy Manufacturing Co. (United States, Jan. 21.) 33003.

MANUFACTURE OF AMINO CYCLIC SULPHONAMIDES and their derivatives.—Ward, Blenkinsop and Co., Ltd., B. P. H. Wiesner and E. Katscher. 33054.

PROCESS FOR PRODUCING ALKYLATED AROMATIC COMPOUNDS.—A. Abbey (Dow Chemical Co.). 582.

PRINTING AND COLOURING OF MATERIALS.—American Cyanamid Co. (United States, Jan. 21, '39.) 327.

MANUFACTURE OF ALIPHATIC ACIDS.—British Industrial Solvents, Ltd., and P. Mautner. 572.

PRODUCTION OF ACETYLENE DERIVATIVES.—Distillers Co., Ltd., H. P. Staudinger and K. H. W. Tuerck. 372.

METHODS FOR REDUCING the viscosity of chlorinated rubber.—L. Mellersh-Jackson (Hercules Powder Co.). 335.

AQUEOUS EMULSIONS.—Lever Bros. and Unilever, Ltd., and L. de Waal. 268.

PROCESS FOR SWEETENING HYDROCARBON DISTILLATES.—N. V. de Bataafsche Petroleum Maatschappij. (United States, Jan. 28, '39.) 395.

PRODUCTION OF PHOSPHORIC ACID and salts thereof.—W. Siegel. 208.

PRODUCTION AND EMPLOYMENT OF SYNTHETIC RESINS.—Small and Parkes, Ltd., and C. A. Redfarn. 225.

MANUFACTURE OF AZO DYESTUFFS.—Soc. of Chemical Industry in Basle. (Switzerland, Jan. 5, '39.) 304. (Switzerland, Dec. 14, '39.) 305.

PROCESS FOR THE SIZING and finishing of textiles by treatment with drying oils.—Rhodiaceta. (France, Feb. 21, '39.) 543.

TREATMENT OF OILS with selective solvents.—Standard Oil Development Co. (United States, Feb. 27, '39.) 564.

CHEMICAL REACTIONS involving the presence of finely divided solid materials.—N. Testrup, T. Gram and Techno-Chemical Laboratories, Ltd. 484.

METHOD OF PRODUCING mixtures for the rubber, etc., industries. A. A. Thornton (Delaware Chemical Engineering Co.). 541.

PROCESS FOR ISOMERISING PARAFFIN HYDROCARBONS.—Universal Oil Products Co. (United States, Jan. 20, '39.) 569.

METHOD OF MANUFACTURING dried starch conversion products.—J. F. Walsh and American Maize-Products Co. 365.

PRODUCTION OF POLYMERISED PRODUCTS.—A. Wassermann. 485.

Complete Specifications Open to Public Inspection

PROCESS FOR THE PRODUCTION of N-methyl-β-phenylethylamines. T. H. Temmler (trading as Temmler-Werke Vereinigte Chemische Fabriken H. Temmler.

ELECTRODEPOSITION OF CUPROUS OXIDE, and baths therefor.—Kansas City Testing Laboratory. May 24, 1938. 32714/38.

TREATMENT OF IRON AND ZINC or of alloys of either iron or zinc, for the production thereon of phosphate coatings.—American Chemical Paint Co May 27, 1938. 37069/38.

PROCESS AND APPARATUS for the manufacture of white lead possessing a special granular structure.—A. Deval. May 27, 1938. 11071/39.

PROCESS OF PREPARING aliphatic polycarboxylic acids, and the aliphatic polycarboxylic acids resulting therefrom.—Armour and Co. May 27, 1938. 11359/39.

PROCESS FOR THE PRODUCTION of a highly disperse pigment.—I. G. Farbenindustrie. May 16, 1938. 11851/39.

PROCESS FOR WORKING-UP SULPHITIC WASTE LIQUORS from industries working-up viscose.—Vereinigte Glanzstoff Fabriken A.-G. May 24, 1938. (Cognate Application, 12495/39.) 12494/39.

MANUFACTURE OF β-ALKOXY-ALDEHYDES.—Deutsche Gold-und Silber-Scheideanstalt vorm. Roessler. May 19, 1938. 13733/39.

PRODUCTION OF UNSATURATED ACIDS and their esters.—Deutsche Gold-und Silber-Scheideanstalt vorm. Roessler. May 19, 1938. 13735/39.

MANUFACTURE OF VINYL ESTERS.—Rohm and Haas Ges. May 18, 1938. 14495/39.

MANUFACTURE OF GLUCOSIDE-LIKE COMPOUNDS of the steroid series.—Schering A.-G. May 16, 1938. (Cognate Application, 14508/39.) 14507/39.

MANUFACTURE OF ESTERS of unsaturated acids.—British Celanese, Ltd. May 27, 1938. 15299/39.

RESINOUS COMPOSITIONS.—British Thomson-Houston Co., Ltd May 27, 1938. 15318/39.

MANUFACTURE OF VAT DYESTUFFS of the anthraquinone series.—I. G. Farbenindustrie. May 27, 1938. 15723/39.

PRODUCTION OF VITAMIN-F PREPARATIONS.—Oelwerke Noury and Van der Lande Ges. May 27, 1938. 15776/39.

CUPROUS CHLORIDE-POTASSIUM CHLORIDE CATALYST for polymerising acetylene to vinylacetylenes.—E. I. du Pont de Nemours and Co. May 26, 1938. 15791/39.

PROCESS FOR THE TREATMENT of olefinic hydrocarbons.—Universal Oil Products Co. May 31, 1938. 856/39.

APPARATUS FOR GENERATING OXYGEN from chemicals.—O. H. Drager. June 15, 1938. 12284/39.

MANUFACTURE OF SUPERPHOSPHATE FERTILISERS.—Davison Chemical Corporation. June 15, 1938. 13129/39.

APPARATUS FOR THE INJECTION-MOULDING of thermo-setting plastic masses or compositions.—J. Krause Ges. June 27, 1938. 26042/38.

PROCESS FOR THE MANUFACTURE of condensation products from β-tocopherol and α, β-unsaturated alkayl halides.—F. Hoffmann-La Roche and Co. June 1, 1938. 15016/39.

COUMARONES AND CHROMANES and method of producing the same.—University of Minnesota. May 31, 1938. 15116, 15117/39.

MANUFACTURE OF DIBROMOFLUORANTHENE.—Soc. of Chemical Industry in Basle. May 28, 1938. 15397/39.

PRODUCTION OF WHITE OPAQUE ENAMELS or varnishes.—Deutsche Gold- und Silber-Scheideanstalt vorm. Roessler. June 1, 1938. 15459/39.

GAS PRODUCERS.—Hansa-Gas-Generatoren Ges. May 28, 1938. 15539/39.

DYEING OF CELLULOSE ESTERS.—I. G. Farbenindustrie. May 28, 1938. 15722/39.

METHOD AND APPARATUS for the cracking and/or distillation of oil.—Mannesmannrohren-Werke. May 31, 1938. 15958/39.

PROCESS FOR THE MANUFACTURE of compounds of the cyclopentanopolyhydrophenanthrene series.—Schering A.-G. May 31, 1938. 15959/39.

MANUFACTURE OF ACID AZO DYESTUFFS.—I. G. Farbenindustrie. May 30, 1938. 15962/39.

SOLVENT EXTRACTION PROCESS.—Standard Oil Development Co. June 4, 1938. 9981/39.

RECOVERY OF SILVER from waste hyposulphitic liquids.—A. Muhlethaler Soc. Anon. April 15, 1938. 10157/39.

PROCESS OF REMOVING SILICA from alumino-silicates, especially clay.—I. G. Farbenindustrie. June 8, 1938. 12113/39.

OPAQUING AGENT FOR ENAMELS, and process for manufacturing same.—May 5, 1938. 12380/39.

MANUFACTURE OF AMIDINES.—Soc. of Chemical Industry in Basle. May 11, 1938. 13684/39.

MANUFACTURE OF 4-CHLORO-5-NITRO-1-NAPHTHOMETHYL-CHLORIDE. I. G. Farbenindustrie. June 4, 1938. 14442/39.

PROCESS FOR THE REACTIVATION of oxidic purification masses.—I. G. Farbenindustrie. June 3, 1938. 15682/39.

PROCESS FOR THE PREPARATION of N-alkyl-w-sulphonic acid of the anthraquinone series.—Sandoz, Ltd. May 30, 1938. 15927/39.

PROCESS FOR PREPARING MANGANATES.—Azot Spolka Akcyjna. June 4, 1938. 16007/39.

MANUFACTURE OF A LEUCO-SULPHURIC ACID ESTER of an indigoid vat dyestuff.—I. G. Farbenindustrie. June 1, 1938. 16055/39.

PROCESS FOR THE PREPARATION of very active wave-stilling oils, and the products resulting therefrom.—Compagnie Francaise de Raffinage. June 2, 1938. 16063/39.

PROCESS FOR THE PURIFICATION of organic compounds.—N. V. de Bataafsche Petroleum Maatschappij. June 6, 1938. 16071/39.

PROCESS FOR HYDRATING LIME.—G. and W. H. Corson, Inc. June 4, 1938. 16171/39.

MANUFACTURE OF MONOAZO DYESTUFFS.—I. G. Farbenindustrie. June 2, 1938. 16176/39.

METHOD OF REMOVING ARSENIC and phosphorus from ores.—Uddeholms Aktiebolag. June 4, 1938. 16261/39.

MANUFACTURE OF ARTIFICIAL RUBBER-LIKE MASSES.—I. G. Farbenindustrie. June 4, 1938. 16302/39.

PRODUCTION OF HIGH VALUE ALCOHOLS from sugars and sugary substances.—Oelwerke Noury and Van der Lande Ges. June 3, 1938. 16378/39.

PRODUCTION OF AMINO ACIDS.—Corn Products Refinery Co. June 3, 1938. 16420/39.

PREPARATION OF HYDROGEN PEROXIDE.—H. Schmidt. June 4, 1938. 16495/39.

MANUFACTURE OF AZO DYESTUFFS.—Imperial Chemical Industries, Ltd. June 4, 1938. 16507-8/39.

MANUFACTURE OF ARTIFICIAL THREADS.—I. G. Farbenindustrie. June 7, 1938. 16578/39.

MANUFACTURE OF CELLULOSE DERIVATIVES.—British Celanese, Ltd. June 7, 1938. 16611/39.

SYNTHETIC RESINOUS COMPOSITIONS, and methods of making same.—British Thomson-Houston Co., Ltd. June 8, 1938. 16613/39.

Specifications Accepted with Date of Application

PROCESS FOR THE MANUFACTURE of lead chromate and a mixture of lead chromate and sulphate.—Priestman Collieries, Ltd., and T. G French. March 19, 1938. 515,995.

PROCESS FOR THE MANUFACTURE OF DYESTUFFS.—R. Gaspar. May 19, 1938. 515,998.

MANUFACTURE OF COMPOUNDS of the cyclopentanopolyhydrophenanthrene series.—Soc. of Chemical Industry in Basle. May 29, 1937. 516,056.

PRODUCTION OF ZEIN SOLUTIONS.—International Patents Development Co. July 26, 1937. 515,999.

PREPARATION OF LACTONES.—H. Hunsdiecker, H. Erlbach, and E. Vogt. June 12, 1937. (Cognate Application, 17514/38.) 516,000.

PRODUCTION OF ASCORBIC ACID.—A. H. Stevens (C. Pfizer and Co.). June 14, 1938. 516,115.

PRODUCTION OF POLYVINYL SYNTHETIC RESINS.—Kodak, Ltd. June 23, 1937. 516,118.

PACKINGS FOR BOTTLES and other fragile articles.—W. A. Sears, and Compressed Paper Packing, Ltd. June 8, 1938. (Cognate Application, 10146/39.) 515,938.

REDUCING CHROMOUS AND CHROMIC CHLORIDES.—Great Western Electro-Chemical Co. August 3, 1937. 515,953.

PRODUCTION OF STARCH.—International Patents Development Co., and F. O. Giesecke. June 16, 1938. 516,066

PROCESS FOR THE MANUFACTURE OF HIGHER FATTY ACID CHLORIDES.—A. Carpmael (I. G. Farbenindustrie.) June 16, 1938. 515,963.

PURIFICATION OF MINERAL OIL PRODUCTS.—Trinidad Leaseholds, Ltd., and E. Hene. June 18, 1938. 516,019.

TREATMENT OF MATERIALS containing tantalum and/or niobium. F. Cuvelliez and Soc. Generale Metallurgique de Hoboken. June 20, 1938. (Addition to 474,068.) 516,068.

PRODUCING FAST TINTS ON CELLULOSIC FIBRES.—Soc. of Chemical Industry in Basle. June 19, 1937. (Cognate Application 18254/38.) 516,076.

MANUFACTURE OF DERIVATIVES OF CHRYSENE.—Soc. of Chemical Industry in Basle. June 21, 1937. (Cognate Applications, 18395/38, 18396/38, 18397/38, 18398/38, and 18399/38.) 516,130.

MANUFACTURE OF NITROGENOUS CONDENSATION PRODUCTS.—Soc. of Chemical Industry in Basle. June 21, 1937. (Cognate Applications, 18401/38, 18402/38, 18403/38, 18404/38, and 18405/38). 516,131.

PRODUCTION OF CELLULOSE DERIVATIVE or cellulose conversion product compositions.—A. A. Houghton, and Imperial Chemical Industries, Ltd. June 21, 1938. 516,144, 516,145.

METHOD OF PRODUCING A STABILISED DIAZO COMPOUND.—Calco Chemical Co., Inc. July 12, 1937. 515,980.

COLOURING-MATERIAL, and compositions for this purpose.—Calco Chemical Co., Inc. July 12, 1937. 515,981.

RESINOUS COMPOSITIONS and articles made therefrom.—British Thomson-Houston Co., Ltd. July 10, 1937. 515,985.

PROCESS FOR THE MANUFACTURE OF CARBOXYLIC ACIDS of the cyclopentanopolyhydrophenanthrene series.—Schering, A.-G. July 7, 1937. (Samples furnished.) 516,030.

MANUFACTURE OF QUATERNARY AMINO KETONES.—J. R. Geigy, A.-G. July 16, 1937. (Samples furnished.) 516,090.

METHOD OF CONCENTRATING, purifying, and separating the disperse phase of colloidal dispersions.—Semperit Osterreichisch-amerikanische Gummiwerke, A.-G. July 27, 1937. 516,092.

MANUFACTURE AND PRODUCTION OF HYDROCARBONS from carbon monoxide and hydrogen.—G. W. Johnson (I. G. Farbenindustrie.) July 23, 1938. 516,160.

MANUFACTURE OF ALKYL PHENOLS.—W. J. Tennant (Dow Chemical Co.). Oct. 21, 1938. 516,164.

PROTEIN MATERIAL, and process of making same.—Soysein Process Corporation. April 6, 1937. 516,340.

TREATMENT OF CARBONACEOUS MATERIALS for the production of water gas or producer gas.—A. R. Griggs. March 28, 1938. 516,281.

MANUFACTURE OF COMPOUNDS.—H. D. K. Drew, D. B. Kelly, and Imperial Chemical Industries, Ltd. May 28, 1938. 516,342.

MANUFACTURE OF ARTIFICIAL RESINS.—Albert Products, Ltd. June 18, 1937. 516,344.

PREPARATION OF HYDROCARBONS from carbon monoxide and hydrogen.—G. W. Johnson (I. G. Farbenindustrie). June 20, 1938. 516,352.

CATALYTIC CONVERSION OF ALCOHOLS TO OLEFINES.—Distillers Co., Ltd., and T. B. Philip. June 21, 1938. 516,360.

DYESTUFF MIXTURES, and applications thereof.—Soc. of Chemical Industry in Basle. June 22, 1937. 516,240.

MANUFACTURE OF TITANIUM PIGMENTS.—British Titan Products Co., Ltd., A. G. Oppegaard and C. J. Stopford. June 23, 1938. 516,369.

MANUFACTURE OF HETEROCYCLIC COMPOUNDS.—May and Baker, Ltd., A. J. Ewins, M. A. Phillips and G. Newbery. June 23, 1938. 516,288.

OBTAINING MAGNESIUM from oxidic magnesium compounds by reduction with carbon.—Magnesium Metal Corporation, Ltd. June 24, 1938. 516,381.

THERAPEUTICALLY VALUABLE DIGUANIDINE COMPOUNDS.—May and Baker, Ltd., A. J. Ewins, H. J. Barber, and A. D. H. Self. June 24, 1938. 516,289.

MANUFACTURE OF VAT DYESTUFFS.—I. G. Farbenindustrie. June 25, 1937. 516,391.

CARBONISING OR COKING OF FUEL.—Didier-Werke A.-G. Oct. 21, 1937. 516,399.

PRODUCTION OF FLOCCULATING GELS.—J. O. Samuel and Unifloc Reagents, Ltd. June 29, 1938. 516,294.

METHOD OF AND APPARATUS FOR CHARGING CARBONISING PLANT, such as coke ovens and retorts.—Woodall-Duckham (1920), Ltd., R. F. Krall and F. S. Townsend. July 19, 1938. 516,327.

CATALYTIC PREPARATION OF LIQUID HYDROCARBONS by reduction of carbon monoxide.—A. M. G. M. Luyckx. July 20, 1937. 516,329.

MANUFACTURE AND PRODUCTION of organic halogen-sulphonic acid chlorides.—G. W. Johnson (I. G. Farbenindustrie). July 28, 1938. 516,214.

MANUFACTURE AND PRODUCTION of hydrocarbons from carbon monoxide and hydrogen.—G. W. Johnson (I. G. Farbenindustrie). Aug. 2, 1938. 516,403.

Weekly Prices of British Chemical Products

TAKING the market as a whole quite a good trade has been put through during the past week with industrial chemicals the chief centre of interest. Acetic acid, acetone and formaldehyde are all active items and a steady inquiry is circulating for oxalic and formic acids. So far as the price position is concerned quotations are steady with a firm undertone. An advance in the schedule of prices for iodine and potassium iodide have been notified by the makers. Whilst many of the supply difficulties experienced by consumers during the past few months are gradually being overcome, there remains a wide range of chemicals supplies of which are not available for immediate delivery, and for quite a few items there would appear to be no prospect that production will be sufficient to meet the increased demand on the home market brought about by the relatively high cost and uncertainty of shipments from overseas. Business in coal tar products has been fairly steady during the week and prices have moved within narrow limits. Offers of carbolic acid crystals remain scarce.

MANCHESTER.—Although prices on the Manchester chemical market continue on a very firm basis actual changes on balance for the week have been few and relatively slight. The general tendency, however, is upward and buyers are not hesitating to cover themselves as far forward as sellers are prepared to go. There is a steady call for supplies of general chemicals, including the soda compounds, and good aggregate deliveries are reported. Potash materials are mostly in short supply and values are strong. In the tar products market locally a moderately active inquiry has been reported this week and users are calling for steady deliveries against existing commitments.

GLASGOW.—Business remains steady in the Scottish heavy chemical market, and a considerable amount of buying is being done in all commodities. Prices both for home and export remain very stable.

Price Changes

Rises: Iodine, Potassium Iodide, Sodium Hyposulphite.

Falls: Toluol (Manchester).

* In the case of certain products, here marked with an asterisk, the market is nominal, and the last ascertainable prices have been included.

General Chemicals

ACETIC ACID.—Maximum prices per ton: 80% technical, 1 ton, £34 15s.; 10 cwt./1 ton, £35 15s.; 4/10 cwt., £36 15s.; 80% pure, 1 ton, £36 15s.; 10 cwt./1 ton, £37 15s.; 4/10 cwt., £38 15s.; commercial glacial, 1 ton, £44; 10 cwt./1 ton, £45; 4/10 cwt., £46; delivered buyers' premises in returnable barrels. £4 per ton extra if packed and delivered in glass.

ACETONE.—Maximum prices per ton, 50 tons and over, £49 10s.; 10/50 tons, £50; 5/10 tons, £50 10s.; 1/5 tons, £51; single drums, £52, delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each; delivered in containers of less than 45 gallons but not less than 10 gallons £10 10s. per ton in excess of maximum prices; delivered in containers less than 10 gallons each £10 10s. per ton in excess of maximum prices, plus a reasonable allowance.

*ALUM.—Loose lump, £8 7s. 6d. per ton d/d.

*ALUMINIUM SULPHATE.—£7 5s. 0d. per ton d/d Lancs.

AMMONIA, ANHYDROUS.—99.95%, 1s. to 2s. per lb. according to quantity in loaned cylinders, carriage paid; less for important contracts.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey galvanising, £18 per ton, in casks, ex wharf. See also Salammoniac.

*ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—99/100%, about £25 per ton, ex store

BARIUM CHLORIDE.—98/100%, prime white crystals, £11 10s. 0d. to £13 0s. 0d. per ton when available, bag packing, ex works; imported material would be dearer.

BLEACHING POWDER.—Spot, 35/37% £9 5s. per ton in casks, special terms for contract.

BORAX, COMMERCIAL.—Granulated, £20 10s. per ton; crystal, £21 10s.; powdered, £22; extra finely powdered, £23; B.P. crystals, £29 10s.; powdered, £30; extra fine, £31 per ton for ton lots in free 1-cwt. bags, carriage paid in Great Britain. Borax Glass, lump, £64; powder, £65; in tin-lined cases for home trade only, packages free, carriage paid in Great Britain.

BORIC ACID.—Commercial granulated, £34 10s. per ton; crystal, £35 10s.; powdered, £36 10s.; extra finely powdered, £38 10s.; large flakes, £47; B.P. crystals, £43 10s.; powdered, £44 10s.; extra fine powdered, £46 10s. per ton for ton lots, in free 1-cwt. bags, carriage paid in Great Britain.

CALCIUM BISULPHITE.—£7 10s. per ton f.o.r. London.

*CALCIUM CHLORIDE.—GLASGOW: 70/75% solid, £5 12s. 6d. per ton ex store.

CHARCOAL LUMP.—£7 5s. to £11 per ton, ex wharf. Granulated £7 to £9 per ton according to grade and locality.

*CHLORINE, LIQUID.—£18 15s. per ton, seller's tank wagons, carriage paid to buyer's sidings; £19 5s. per ton, d/d in 16/17 cwt. drums (3-drum lots); £19 10s. per ton d/d in 10-cwt. drums (4-drum lots); 4½d. per lb. d/d station in single 70-lb. cylinders.

CHROMETAN.—Crystals, 3⅜d. per lb.; liquor, £19 10s. per ton d/d station in drums.

CHROMIC ACID.—10½d. per lb., less 2½%; d/d U.K.

CHROMIC OXIDE.—1s. 1d. per lb., d/d U.K.

CITRIC ACID.—1s. 1½d. per lb. MANCHESTER: 1s. 3d.

*COPPER SULPHATE.—Nominal.

CREAM OF TARTAR.—100%, £5 2s. to £5 7s. per cwt., less 2½%. Makers' prices nominal, imported material about £170 per ton.

FORMALDEHYDE.—40% by volume, £23 5s. to £25 per ton, according to quantity, d/d in sellers' returnable casks.

FORMIC ACID.—85%, £44 10s. per ton for ton lots, carr. paid, carboys returnable; smaller parcels quoted at 46s. 6d. to 49s. 6d. per cwt., ex store.

GLYCERINE.—Chemically pure, double distilled, 1,260 s.g., in tins, £3 10s. to £4 10s. per cwt. according to quantity; in drums, £3 2s. 6d. to £3 16s. 0d. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

HEXAMINE.—Technical grade for commercial purposes, 1s. 4d. per lb.; free-running crystals are quoted at 1s. 7d. per lb.; carriage paid for bulk lots.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 9s. 2d. to 13s. per lb., according to quantity.

LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £30 10s. per ton; 50% by weight, £35; 80% by weight, £60; pale tech., 50% by vol., £36; 50% by weight, £42; 80% by weight, £67. One ton lots ex works; barrels returnable.

LEAD ACETATE.—White, £48 to £50, ton lots.

LEAD NITRATE.—About £40 per ton in casks.

LEAD, RED.—English, 5/10 cwt., £41 10s.; 10 cwt. to 1 ton, £41 5s.; 1/2 tons, £41; 2/5 tons, £40 10s.; 5/20 tons, £40; 20/100 tons, £39 10s.; over 100 tons, £39 per ton, less 2½ per cent., carriage paid; non-setting red lead, 10s. per ton dearer in each case; Continental material, £1 per ton cheaper.

LEAD, WHITE.—Dry English, less than 5 tons, £51; 5/15 tons, £47; 15/25 tons, £46 10s.; 25/50 tons, £46; 50/200 tons, £45 10s. per ton, less 5% carriage paid; Continental material, £1 per ton cheaper. Ground in oil, English, 1/5 cwt., £59; 5/10 cwt., £58; 10 cwt. to 1 ton, £57 10s.; 1/2 tons, £56; 2/5 tons, £55; 5/10 tons, £53; 10/15 tons, £52; 15/25 tons, £51 10s.; 25/50 tons, £51; 50/100 tons, £50 10s. per ton, less 5% carriage paid. Continental material £2 per ton cheaper.

LITHARGE.—10 cwt.-1 ton, £34 15s. per ton.

MAGNESITE.—Calcined, in bags, ex works, about £9 to £10 per ton.

MAGNESIUM CHLORIDE.—Solid (ex wharf), £10 per ton.

*MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf

MERCURY PRODUCTS.—Controlled prices for 1 cwt. quantities: Bichloride powder, 7s. 5d.; bichloride lump, 8s.; bichloride ammon. powder, 8s. 11d.; bichloride ammon. lump, 8s. 9d.; mercurous chloride, 8s. 11d.; mercury oxide, red cryst., B.P., 10s. 3d.; red levig. B.P., 9s. 9d.; yellow levig. B.P., 9s. 7d.

*METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities.

*NITRIC ACID.—Spot, £25 to £30 per ton, according to strength, quantity and destination.

OXALIC ACID.—£59 5s. per ton for ton lots, carriage paid, in 5-cwt. casks; smaller parcels, 59s. 9d. to 60s. per cwt., ex store; deliveries slow.

*PARAFFIN WAX.—GLASGOW: 3¾d. per lb.

POTASH, CAUSTIC.—Liquid, £25 to £30 per ton, according to quantity.

POTASSIUM BICHROMATE.—5¾d. per lb. carriage paid. GLASGOW: 5¾d. per lb., carriage paid.

POTASSIUM CHLORATE.—Imported powder and crystals, ex store London, 10d. to 1s. per lb.

POTASSIUM IODIDE.—B.P., 8s. to 11s. 2d. per lb., according to quantity.

POTASSIUM NITRATE.—Small granular crystals, £26 to £29 per ton ex store, according to quantity.

POTASSIUM PERMANGANATE.—B.P. 1s. 3½d. per lb.; commercial, 143s. per cwt., d/d.

POTASSIUM PRUSSIATE.—Yellow, about 1s. 8d. per lb., supplies scarce.

SALAMMONIAC.—Dog-tooth crystals, £42 per ton; medium, £38; fine white crystals, £16; in casks, ex store.

SALT CAKE.—Unground, spot, £3 15s. per ton.

SODA ASH.—Light 98/100%, £5 17s. 6d. per ton f.o.r. in bags.

SODA, CAUSTIC.—Solid, 76/77° spot, £14 per ton d/d station.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.

SODIUM ACETATE.—£25 to £26 per ton, ex wharf.

SODIUM BICARBONATE.—About £10 10s. to £11 10s. per ton, in bags.

SODIUM BICHROMATE.—Crystals, 4¾d. per lb., net d/d U.K. with rebates for contracts. GLASGOW: 4¾d. per lb., carriage paid.

SODIUM BISULPHITE POWDER.—60/62%. £12 10s. to £14 per ton d/d in 2-ton lots for home trade.

SODIUM CARBONATE MONOHYDRATE.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.

SODIUM CHLORATE.—£27 10s. to £32 per ton, d/d according to quantity.

SODIUM HYPOSULPHITE.—Pea crystals, £16 17s. 6d. per ton for 2-ton lots; commercial, £13 10s. per ton. MANCHESTER: Commercial, £12; photographic, £16 10s.

SODIUM IODIDE.—B.P., for not less than 28 lb., 8s. 10d. per lb.; for not less than 7 lb., 10s. 9d. per lb.

*SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.

SODIUM NITRATE.—Refined, £8 5s. per ton for 6-ton lots d/d.

SODIUM NITRITE.—£18 5s. per ton for ton lots.

SODIUM PERBORATE.—10%, £4 per cwt. d/d in 1-cwt. drums.

SODIUM PHOSPHATE.—Di-sodium, £16 to £17 per ton delivered for ton lots. Tri-sodium, £18 per ton delivered per ton lots.

SODIUM PRUSSIATE.—4¼d. to 5¼d. per lb.

SODIUM SILICATE.—£8 2s. 6d. per ton.

*SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.

SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. MANCHESTER: £4.

SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £13; crystals, £9 15s.

*SODIUM SULPHITE.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.

*SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.

SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.

TARTARIC ACID.—1s. 2½d. per lb., less 5%, carriage paid for lots of 5 cwt. and upwards. Makers' prices nominal; imported material 2s. 3d. to 2s. 6d. per lb., ex wharf. MANCHESTER: 1s. 5d. per lb.

ZINC OXIDE.—Maximum prices: White seal, £30 17s. 6d. per ton; red seal, £28 7s. 6d. d/d; green seal, £29 17s. 6d. d/d buyers' premises.

ZINC SULPHATE.—Tech., about £19 10s., carriage paid, casks free.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 9½d. to 1s. 6d. per lb., according to quality. Crimson, 1s. 7½d. to 1s. 10½d. per lb.

ARSENIC SULPHIDE.—Yellow, 1s. 6d. to 1s. 8d. per lb.

CARBON DISULPHIDE.—£29 to £34 per ton, according to quantity, in free returnable drums.

CARBON TETRACHLORIDE.—£48 to £53 per ton, according to quantity, drums extra.

CHROMIUM OXIDE.—Green, 1s. 3d. per lb.

INDIA-RUBBER SUBSTITUTES.—White, 5¾d. to 6¾d. per lb.; dark 5½d. to 6d. per lb.

LITHOPONE.—30%, £16 15s. per ton; 60%, £31 to £32 per ton. Imported material would be dearer.

SULPHUR CHLORIDE.—6d. to 8d. per lb., according to quantity.

VEGETABLE BLACK.—£35 per ton upwards; 28/30%, £15 10s. 0d.; 60%, £29, delivered buyers' premises.

VERMILION.—Pale or deep, 8s. 5d. per lb., for 7 lb. lots.

ZINC SULPHIDE.—About £63 per ton ex works.

Plus 5% War Charge.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—Per ton in 6-ton lots d/d farmer's nearest station up to January 31, 1940, £9; February, £9 3s.; March/June, £9 6s.

CALCIUM CYANAMIDE.—£12 10s. for 5-ton lots per ton net f.o.r. or ex store, London. Supplies small.

"NITRO-CHALK."—£8 18s. per ton, in 6-ton lots, d/d farmer's nearest station, January/June delivery.

CONCENTRATED COMPLETE FERTILISERS.—£11 18s. to £12 4s. per ton in 6-ton lots, d/d farmer's nearest station.

AMMONIUM PHOSPHATE FERTILISERS.—£11 14s. to £16 6s. per ton in 6-ton lots, d/d farmer's nearest station.

Coal Tar Products

BENZOL.—Industrial (containing less than 2% of toluol), 2s. to 2s. 1d. per gal., ex works, nominal.

CARBOLIC ACID.—Crystals, 11½d. per lb.; Crude, 60's, 3s. 3d. to 3s. 6d., according to specification. MANCHESTER: Crystals, 10d. to 11d. per lb., d/d; crude, 3s .6d. to 3s. 9d.; naked, at works.

CREOSOTE.—Home trade, 5d. per gal., f.o.r., makers' works; exports 6d. to 6½d. per gal., according to grade. MANCHESTER: 4½d. to 6½d.

CRESYLIC ACID.—99/100%, 2s. 9d. to 3s. 3d. per gal., according to specification. MANCHESTER: Pale, 99/100%, 3s.

NAPHTHA.—Solvent, 90/160°, 1s. 8d. to 1s. 9d. per gal.; solvent, 95/160°, 2s., naked at works; heavy, 90/190°, 1s. 4d. to 1s. 5d. per gal., naked at works, according to quantity. MANCHESTER: 90/160°, 1s. 6½d. to 1s. 9d. per gal.

NAPHTHALENE.—Crude, whizzed or hot pressed, £8 15s. to £10 15s. per ton; purified crystals, £16 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £3 to £4 10s. per ton. MANCHESTER: Refined, £17 to £18.

PITCH.—Medium, soft, 35s. per ton, f.o.b. MANCHESTER: 37s. 6d. to 40s., f.o.b. East Coast.

PYRIDINE.—90/140°, 17s. to 19s. per gal.; 90/160°, 14s. to 16s.; 90/180°, 3s. to 4s. 6d. per gal., f.o.b. MANCHESTER: 17s. to 19s. 6d. per gal.

TOLUOL.—90%, 2s. 3d. per gal.; pure, 2s. 5d., nominal. MANCHESTER: Pure, 2s. 5d. per gal., naked.

XYLOL.—Commercial, 2s. 7d. per gal.; pure, 2s. 9d. MANCHESTER: 2s. 9d. per gal.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £7 5s. to £8 per ton; grey, £10 to £12. MANCHESTER: Grey, £14.

METHYL ACETONE.—40.50%, £35 to £38 per ton.

WOOD CREOSOTE.—Unrefined, 1s. to 1s. 3d. per gal., according to boiling range.

WOOD NAPHTHA, MISCIBLE.—3s. 7d. to 4s. per gal.; solvent, 4s. to 4s. 6d. per gal.

WOOD TAR.—£4 to £5 per ton, according to quality.

Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.

BENZALDEHYDE.—1s. 10d. per lb., for cwt. lots, net packages.

BENZIDINE, HCl.—2s. 7d. per lb., 100% as base, in casks.

BENZOIC ACID, 1914 B.P (ex toluol).—1s. 11d. per lb. d/d buyer's works.

m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.

o-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.

p-CRESOL 34/35° C.— 1s. 7d. to 1s. 8d. per lb. in ton lots.

DICHLORANILINE.—2s. 1½d. to 2s. 7d. per lb.

DIMETHYLANILINE.—Spot, 1s. 7½d. per lb., package extra.

DINITROBENZENE.—8d. per lb.

DINITROCHLORBENZENE, SOLID.—£79 5s. per ton.

DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 11½d.

DIPHENYLAMINE.—Spot, 2s. 3d. per lb.; d/d buyer's works.

GAMMA ACID, Spot, 4s. 4½d. per lb. 100%, d/d buyer's works.

H ACID.—Spot, 2s. 7d. per lb.; 100%, d/d buyer's works.

NAPHTHIONIC ACID.—1s. 10d. per lb.

β-NAPHTHOL.—£97 per ton; flake, £94 8s. per ton.

α-NAPHTHYLAMINE.—Lumps, 1s. 1d. per lb.

β-NAPHTHYLAMINE.—Spot, 3s. per lb.; d/d buyer's works.

NEVILLE AND WINTHER'S ACID.—Spot, 3s. 3½d. per lb. 100%.

o-NITRANILINE.—4s. 3½d. per lb.

m-NITRANILINE.—Spot, 2s. 10d. per lb. d/d buyer's works.

p-NITRANILINE.—Spot, 1s. 10d. to 2s. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 4½d. to 5½d. per lb., in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.

NITRONAPHTHALENE.—10d. per lb.; P.G., 1s. 0½d. per lb.

SODIUM NAPHTHIONATE.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.

SULPHANILIC ACID.—Spot, 8¾d. per lb. 100%, d/d buyer's works.

o-TOLUIDINE.—11d. per lb., in 8/10 cwt. drums, drums extra.

p-TOLUIDINE.—2s. per lb., in casks.

m-XYLIDINE ACETATE.—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—For the period ending February 3, per ton, net, naked, ex mills, works, or refinery, and subject to additional charges according to package and location of supplies:—LINSEED OIL, raw, £40 10s. RAPESEED OIL, crude, £44 5s. COTTONSEED OIL, crude, £26; washed, £28 15s.; refined edible, £29 12s. 6d.; refined deodorised, £30 10s.. SOYA BEAN OIL, crude, £27; refined deodorised, £31. COCONUT OIL, crude, £22 2s. 6d.; refined deodorised, £25 7s. 6d. PALM KERNEL OIL, crude, £21 10s.; refined deodorised, £24 15s. PALM OIL, refined deodorised, £27. GROUNDNUT OIL, crude, £29 10s.; refined deodorised, £34. WHALE OIL, crude, hardened 42 deg., £24 10s.; refined hardened 42 deg. £27. ACID OILS.—Groundnut, £20; soya, £18; coconut and palm kernel, £18 10s. Non-controlled commodities were neglected at generally late rates. ROSIN, 25s. to 35s. per cwt., ex wharf, according to grade. TURPENTINE, 57s. per cwt., spot, American, including tax, ex wharf, barrels, and ex discount.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

BAIRD & TATLOCK (LONDON), LTD., laboratory furnishers (M. 27/1/40). Jan. 16, £2,000 mortgage (sec. 81, 1929 Act), to A. V. Prior, London; charged on Rokeby, Esher. *£12,500. Aug. 11, 1939.

LIVERPOOL PLASTIC CO., LTD. (M., 27/1/40.) Jan. 13, £1,125 (not ex.) deb., to Dr. O. Rauchwerger, Liverpool; charged on office furniture, factory equipment, etc.

MILFORD PRODUCTS CO., LTD., manufacturing chemists. (M., 27/1/40.) Jan. 3, £75 debentures, part of a series already registered. *Nil. Dec. 31, 1938.

County Court Judgment

HAMILTON CHEMICAL TRUST, LTD., chemists and perfumers. (C.C., 27/1/40.) R.O., 40/41 Wellclose Square, E.1. £22 7s. 4d. Dec. 5, 1939.

Partnership Dissolved

NEW MILLS CO. (P.D. 27/1/40.) (Saml. Jackson & Arthur Conway Lakenham), New Mills, Walsall, manufacturing chemists. Jan. 12, 1940. Debts by S. Jackson.

Company News

Phospherine (Ashton & Parsons), Ltd., have increased their nominal capital by the addition of £100,000, in £1 ordinary shares, beyond the registered capital of £500,000.

Shantung, Ltd., manufacturers of tung oil, etc. have increased their nominal capital by the addition of £10,000, in £1 shares, beyond the registered capital of £10,000.

W. & J. George, Ltd., chemical and physical apparatus manufacturers, etc., have increased their nominal capital by the addition of £20,250, beyond the registered capital of £12,500.

Macleans, Ltd., have increased their nominal capital by the addition of £100,000, beyond the registered capital of £1,600,000. The additional capital is divided into 400,000 ordinary shares of 5s. each.

Beecham Maclean Holdings, Ltd., have increased their nominal capital by the addition of £100,000, beyond the registered capital of £2,850,000. The additional capital is divided into 400,000 ordinary shares of 5s. each.

Redfern's Rubber Works, Ltd., have declared the following final dividends to be paid on February 15 in respect of the year 1939:—3¾ per cent. on A. & B. preference shares making 7½ per cent. for the year; 12½ per cent. on ordinary shares making 17 per cent. (same) for the year. The net profits this year amount to £45,827 as against £34,515 last year.

New Companies Registered

Copeland Products (Stoke), Ltd. (358,461).—Private company. Capital £300 in 300 founders' shares of £1 each. To carry on the business of manufacturers of and dealers in chemicals, colours, gums, dyes, etc. Directors: Daniel Openshaw, Leek Road, Hanley, Stoke-on-Trent; Henry Farrell;; Henry J. Burns; James L. Jeffries.

Kaye and Juniper, Ltd. (358,555).—Private company. Capital £100 in 100 shares of £1 each. To carry on the business of dealers in and manufacturers of chemicals; to carry out chemical processes and research work, etc. Subscribers: Ronald Bexley, Philip S. Strickett. Secretary: Geo. M. Duncan, Aldwych House, Aldwych, W.C.2.

Sandux, Ltd.—(358,348.) Private company. Capital, £100 in 100 shares of £1 each. To carry on business as general merchants, manufacturers, buyers and sellers of lubricants, dealers in wood preservatives and belt dressings, etc. Directors: Jas. R. J. Jones, Vernon S. Goslin. Registered office: Unicorn Wharf, Dace Road, Old Ford, E.3.

Volspray, Ltd. (358,454).—Private company. Capital £2,000 in 2,000 shares of £1 each. To acquire certain assets of Kurt Erlach Limited (in liquidation), and to carry on business as import and export merchants, spraying plant manufacturers and dealers, manufacturers of and dealers in produce, chemicals, cement, oils, colours, pigments and paints, etc. Subscribers: Charles R. Petrie, 12 Ennismore Gardens, S.W.7, Clifford Johnson.

J. A. Sheriffs and Co., Ltd. (21,278).—Private company. Capital, £6,000 in 6,000 shares of £1 each. To carry on the business of analytical, commercial and general chemists, drysalters, importers and manufacturers of and dealers in chemical compounds, etc. Directors: Hugh Mackay, Gilbert E. Dodds, and Harry A. Stewart. Registered office: Royston Works, West Shore Road, Granton, Edinburgh.

Chemical and Allied Stocks and Shares

ALTHOUGH, as a result of the conversion offer, British Government securities have monopolised attention in the stock and share markets, the industrial and various other sections of the Stock Exchange were slightly more active. Share values were inclined to respond quickly to only moderate demand, and sentiment was assisted by the very small selling in evidence in the case of good class investment stocks and shares of the ordinary or equity class.

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Among securities of chemical and kindred companies chief attention centred on Imperial Chemical, and the ordinary were better at 30s. 3d., while the 7 per cent. preference gained 1s. 6d. to 31s. 6d. The market is continuing to take the view that there seem reasonable possibilities of the total dividend on the ordinary units again being brought up to around 8 per cent., on which basis a favourable yield is offered at the current price. B. Laporte were slightly better a around 61s., and in other directions Blythe Colour Works moved up to 7s., while British Drug Houses were marked up 2s. 6d. to 23s. 9d.

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Awaiting publication of the results, United Molasses at 25s. 6d. and Borax Consolidated at 24s. 9d. were little changed, but Courtaulds, whose annual figures are due shortly, were more active and have made the higher price of 36s. 3d. British Celanese and other rayon shares were also inclined to improve, the initiation of interim payments on Lansil ordinary shares having been taken as an indication that in recent months much better conditions have developed in the rayon trade. Other textile shares were also inclined to improve, Bleachers being 4s. 9d., compared with 4s. 6d. a week ago, and Bradford Dyers 6s. 10½d. The market remains hopeful that later in the year the two last-named companies may be able to make a start in dealing with the large arrears of dividend which have accumulated on the preference shares. Until this is completed there can, of course, be no question of a resumption of distributions on the ordinary shares. Good demand developed for leading iron and steel securities on the market view that yields are quite attractive, as in most cases it would seem that dividends are likely to be little changed. E.P.T. will bear heavily on some iron and steel concerns, but, on the other hand, it is assumed that they are likely to remain very actively employed for the duration of the war. Guest Keen made the improved price of 25s., while United Steel were 22s., Stewarts and Lloyds 43s. 6d., Ruston & Hornsby 29s. 6d., Consett Iron 8s. 6d., and Baldwins 6s. 4½d. Richard Thomas preference shares received some attention on hopes that it may be possible to resume dividends in April.

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Elsewhere Gas Light and Coke units at 16s. 6d. were steady, the assumption being that the current price probably already discounts any reduction that may be made in the forthcoming dividend. Associated Cement were out of favour at 53s. 1½d., and British Plaster Board were no better than 22s. 9d. British Oil and Cake preferred ordinary shares were higher at 38s. 9d., while rather more attention was given to United Premier Oil and Cake ordinary, which changed hands around 8s. 1½d. Pinchin Johnson were a few pence better at 18s. 6d., but Wall Paper deferred units have been lowered from 17s. 9d. to 17s.

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Boots Drug were firmer around 40s. and the market is very hopeful that the total distribution will be maintained at the same rate as for the previous year. Beechams Pills deferred were close on 8s., Sangers 20s. 3d. and Timothy Whites improved to 22s. 9d. Elsewhere, Imperial Smelting were lowered from 13s. to 12s. 4½d., and General Refractories were 8s. 9d. Most oil shares showed movements in favour of holders, but best prices touched during the past few days were not fully held. On balance, however, "Shell" have risen from 77s. 6d. to 78s. 9d., and Anglo-Iranian from 56s. 10½d. to 58s. 9d.